DOCUMENT RESUME

ED 360 189 SE 053 760

TITLE	Sharing Success: Mathematics and Science Education.
INSTITUTION	North Carolina Univ., Greensboro. School of Education.; Southeastern Regional Vision for Education (SERVE), Tallahassee, FL.
SPONS AGENCY	Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE	May 93
CONTRACT	R168R20001; RP91002010
NOTE	70p.
AVAILABLE FROM	SERVE Consortium for Mathematics and Science Education, 345 South Magnolia Drive, Suite D-23, Tallahassee, FL 32301-2950.
PUB TYPE	Reports - Descriptive (141)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	Algebra; Chemistry; Constructivism (Learning); *Demonstration Programs; Educational Improvement; Educational Technology; Elementary School Mathematics; Elementary School Science; Elementary Secondary Education; Environmental Education; Experiential Learning; Integrated Curriculum; *Mathematics Education; Mentors; *Program Descriptions; *Science Education; Science Programs
IDENTIFIERS	Hands on Science

ABSTRACT

The SouthEastern Regional Vision for Education (SERVE) is a coalition of educators, business leaders, governors, and policymakers seeking comprehensive and lasting improvement in education in Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina. SERVE'S Consortium for Mathematics and Science Education provides support to members of the system by providing technical assistance, linking and coordinating resources, using technology, and disseminating information about successful practices targeted for at-risk students. This document describes 28 program- that have been categorized as Programs of Excellence, Quality Programs, or Promising Programs. There were 16 Programs of Excellence, 10 Quality Programs, and 2 Promising Programs identified and reviewed. The programs cover the following topics: constructivist learning, elementary mathematics and science, environmental studies, chemistry, physics, biology, problem solving, algebra and pre-algebra, life sciences, mentoring, high school mathematics, general mathematics, and geometry. A section lists 26 exemplary programs identified by the National Diffusion Network. Contact persons are listed for each of the programs reviewed. (MDH)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED360189

SHARING SUCCESS

MATHEMATICS & SCIENCE EDUCATION

SE 053 760

SERVE

SouthEastern Regional Vision for Education

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

BEST COPY AVAILABLE

SHARING SUCCESS:
Mathematics and Science Education

May 1993

SERVE
SouthEastern Regional Vision for Education
Consortium for Mathematics and Science Education

Affiliated with the
Florida Department of Education
and the
School of Education
University of North Carolina at Greensboro

This document was produced with funds from the Office of Educational Research and Improvement, U.S. Department of Education, under contract nos. RP91002010 and R168R20001.

Table of Contents

About the Sharing Success Program iii
About SERVE and the Consortium for Mathematics and Science Education iv
Acknowledgments v

Programs of Excellence
The Constructivist Mathematics Program 3
Elementary Math Lead Teacher 5
Environmental Science Seminar 7
The Hayes Cooper Center for Math, Science, and Technology 9
Integrating Technology Into Elementary Math & Science (InTech) 11
Marietta Hands-On Math 13
Microchemistry 15
Mister Goodmath 17
North Carolina Project for Reform in Science Education 19
A Problem-Solving Approach to Mathematics Instruction 21
Project PEAK 23
Science Mentorships 25
Snapfinger Academy of Mathematics, Science, and Technology 27
Sold on Science 29
TACO (Take A Class Outdoors) 31
Using the Outdoors to Teach Experiential Science 33

Quality Programs
Chemistry for Elementary Teachers 37
Computer-Assisted Instruction for Enrichment and Development Learning 38
Ecocube 39
Gear Up for Learning 40
Homestyle Learning 41
Mathematics and You 42
Opening the Gate 43
Scholastic Chess 44
Schoolyard Habitat-Sudduth Nature Area 45
Science/Math Integration Through Applied Academics 46

Promising Programs
Elementary Hands-On Science 49
Teacher Helping Teacher 50

National Diffusion Network 51
SERVE Order Forms 63

About the Sharing Success Program . . .

The SERVE Sharing Success program recognizes exemplary public school efforts and practices in Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina. The program is designed to increase the awareness and use of exemplary educational programs by identifying and publicizing programs and practices that work. This *Sharing Success* publication documents several dozen of the region's most effective programs in the areas of mathematics and science education.

The Sharing Success selection process begins with an invitation to state education agencies, school districts, and school personnel in the region to nominate excellent science and mathematics education programs. The self-nomination form asks for contact information; school demographics; program philosophy, goals, and objectives; innovative program features; program effectiveness; essential components for transferability; and funding sources.

Nominations are reviewed by a panel of reviewers, consisting of subject area specialists from state departments of education and districts throughout the region. Each nomination form is read and scored by each member of the team. Winning programs are divided into three categories: Programs of Excellence, the top rated programs; Quality Programs, highly rated programs; and Promising Programs, programs that show excellent potential but are new or not fully documented. Programs of Excellence are validated through a site visit by a two-member team of reviewers.

In addition to recognizing exemplary programs and practices, a major purpose of the Sharing Success program is to inform teachers and administrators about educational innovations in the region and encourage them to adopt effective programs and practices. To that end, contact people are listed with each program description, and readers are encouraged to call the contacts for further information about specific programs.

To request a copy of the Sharing Success nomination form or to request additional information about the Sharing Success program, contact the Sharing Success Coordinator at the following address:

SERVE Consortium for Mathematics and Science Education
345 South Magnolia Drive, Suite D-23
Tallahassee, FL 32301-2950
(800)854-0476
(904)922-8533

About SERVE and the Consortium for Mathematics and Science Education . . .

SERVE, the SouthEastern Regional Vision for Education, is a coalition of educators, business leaders, governors, and policymakers seeking comprehensive and lasting improvement in education in Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina. The name of the laboratory reflects a commitment to creating a shared vision for the future of education in the Southeast.

The mission of SERVE is to provide leadership, support, and research to assist state and local efforts in improving educational outcomes, especially for at-risk and rural students. Laboratory goals are to address critical issues in the region, work as a catalyst for positive change, serve as a broker of exemplary research and practice, and become an invaluable source of information for individuals working to promote systemic educational improvement.

Collaboration and networking are at the heart of SERVE's mission, and the laboratory's structure is itself a model of collaboration. The laboratory has four offices in the region to better serve the needs of state and local education stakeholders. The contract management and research and development office is located at the School of Education, University of North Carolina at Greensboro. The laboratory's information office is located in Tallahassee, Florida. Field service offices are located in Atlanta, Greensboro, Tallahassee, and on the campus of Delta State University in Cleveland, Mississippi.

SERVE's Consortium for Mathematics and Science Education works to promote systemic reform in Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina. In collaboration with other stakeholders in the region, the federally funded Consortium works to expand and enhance mathematics and science education by providing technical assistance, linking and coordinating resources, using technology, and disseminating information about successful practices. The goal of the Consortium is to empower educators in the Southeast to provide quality mathematics and science programs for all students.

For more information about the Consortium, contact Francena Cummings, Ph.D., Director, SERVE Consortium for Mathematics and Science Education, 345 South Magnolia Drive, Suite D-23, Tallahassee, FL 32301-2950; (800)854-0476; (904)922-8533.

To request publications or to join the SERVE mailing list (everyone on the mailing list will receive announcements about laboratory products and activities), complete the order forms beginning on p. 63 or contact the SERVE office in Tallahassee.

P.O. Box 5367
Greensboro, NC 27435
(919)334-3211
(800)755-3277
FAX (919)334-3268

345 S. Magnolia Drive
Suite D-23
Tallahassee, FL 32301-2950
(904)922-2300
(800)352-6001
FAX (904)922-2286

41 Marietta Street, NW
Suite 1000
Atlanta, GA 30303
(404)577-7737
(800)659-3204
FAX (404)577-7812

Delta State University
Box 3183
Cleveland, MS 38732
(601)846-4384
(800)326-4548
FAX (601)846-4402

Roy Forbes
Executive Director

Dorothy Routh
Deputy Director

Acknowledgments

Sharing Success in the Southeast: Mathematics and Science Education was produced with the help of a Regional Review Panel, SERVE Field Representatives, teams of on-site reviewers, and many others from the region. Without their dedicated assistance, the Sharing Success program could not be implemented and this publication could not have been produced.

SERVE thanks those educators who submitted nominations of programs for consideration in Sharing Success as well as the teachers, principals, and district staff who are listed as contacts in this document. Their commitment to educational excellence in the Southeast is evident by what their schools and students have achieved and by their willingness to provide information and assistance to other schools interested in replicating their programs and practices.

Regional Review Panel

David Anderson, Education Consultant, North Carolina Department of Public Instruction
Robert Lumsden, Supervisor, Mathematics and Science, Florida Department of Education
Linda Pledger, Mathematics Education Specialist, Alabama Department of Education
Barbara Rous, Project Coordinator, Innovation Center, Georgia
Bobby Stacy, NDN State Facilitator, Mississippi State Department of Education
Ann Stafford, Mathematics Coordinator, School District of Oconee County, South Carolina

SERVE Field Representatives

Deborah Childs-Bowen
Rebecca Ogletree
Deloris Pringle
Lynda Steele
Patricia Sumner
Myrtis S. Tabb
Nancy Verber

On-Site Reviewers

Renée Akbar, Sharing Success Coordinator, SERVE
David Anderson, Education Consultant, North Carolina Department of Public Instruction
Barbara Foster, Associate Director, SERVE
Sandra Gwinn, Chapter I Coordinator, Alabama Department of Education
Marsha Johnson, Eisenhower Coordinator, Alabama Department of Education
Linda Pledger, Mathematics Education Specialist, Alabama Department of Education
Janice Schaeffler, Research Assistant, SERVE
Bobby Stacy, NDN State Facilitator, Mississippi State Department of Education
Lynda Steele, Field Representative, SERVE

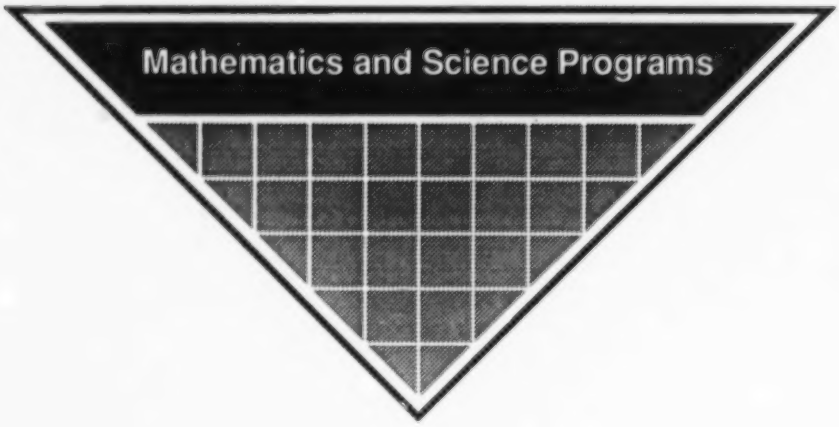
Sharing Success in the Southeast: Mathematics and Science Education

was written and produced by
Renée Akbar, Sharing Success Coordinator; and
Janice Schaeffler, Research Assistant;

edited by
Dianne Wilkes, Educational Programs Specialist;
Stephanie Kadel, Research Associate;
Joseph Follman, Director of Publications; and

designed by
Glenda Johnson, Publication Design Specialist.

Programs of Excellence



The Constructivist Mathematics Program

Programs of Excellence

Elementary Mathematics

Linda Joseph
Teacher
Hall-Kent Elementary School
213 Hall Avenue
Homewood, AL 35209
(205)942-8412

Jack Allison
Principal
Hall-Kent Elementary School
(205)942-3189

Constance Kamii, Ph.D.
Program Leader
School of Education
University of Alabama at Birmingham
Birmingham, AL 35294-1250
(205)934-5371

Grades K-5

Program Description

The Constructivist Mathematics Program at Hall-Kent Elementary School builds on the relationship between student thinking and learning processes by engaging children in collaborative problem solving. This approach to mathematics instruction is based on Jean Piaget's theory that children acquire logical mathematical knowledge by constructing it from within rather than by internalizing it from the environment. Its precepts have been taught to Hall-Kent teachers by faculty from the University of Alabama at Birmingham and Birmingham Southern College, with whom Hall-Kent has had a long-standing relationship.

The Constructivist Mathematics Program does not stress algorithms, but rather encourages children to invent their own procedures for solving problems and to collaborate with each other to find solutions. Textbooks, workbooks, and worksheets have been replaced with three kinds of activities: the study of "real life" situations, discussions of many different ways of solving problems, and games.

Constructivist teachers view children as individuals with their own unique understanding of mathematical concepts and help students invent creative solutions to problems. Instead of emphasizing right answers, constructivist teachers encourage students to describe how they arrived at their answers.

Based on their experience with the Constructivist Mathematics Program, several Hall-Kent teachers have co-authored two books and co-produced three videotapes with Dr. Constance Kamii of the University of Alabama at Birmingham: *Young Children Reinvent Arithmetic* (1985), *Young Children Continue to Reinvent Arithmetic* (1989), *Double-Column Addition* (1989), *Multiplication of Two-Digit Numbers* (1990), and *Multidigit Division* (1990). An annual Constructivist Math Conference, another result of the project, has been initiated as a collaborative effort among teachers in Homewood, Hoover, and Jefferson Counties; the University of Alabama at Birmingham; and Birmingham Southern College.

Goals

The Constructivist Program was designed after low test scores indicated that many children at Hall-Kent lacked an understanding of mathematical concepts. At the time, mathematics was taught separately from other subject areas, instruction involved only low-level thinking skills and offered children few opportunities to build on prior knowledge to en-

hance their skills. As a result, children neither excelled at mathematics nor enjoyed it. To remedy these problems, the Constructivist Program has sought to help children improve their thinking skills, develop confidence in their ability to solve problems, recognize that mathematics is logical, and seek truth by exchanging points of view.

Effectiveness

Children in the Constructivist Program understand arithmetic skills such as place value much better than students who were taught with traditional methods. They exhibit enthusiasm for mathematics and a sense of satisfaction when they are able to "defend" their solutions to problems.

Another indicator of the program's success is that many parents are now asking that their children be placed in classes where teachers use the constructivist approach.

Elementary Math Lead Teacher

Programs of Excellence

Elementary Mathematics

Ann K. Stafford
Coordinator
School District of Oconee County
Post Office Box 649
Walhalla, SC 29691
(803)638-4068

Grades K-6

Program Description

A collaborative effort between the University of Chicago and the School District of Oconee County, South Carolina, the Elementary Math Lead Teacher Program is a staff development model designed to improve mathematics instruction. In this program, generalist elementary teachers are trained to serve as Math Lead Teachers who provide leadership in the area of mathematics to elementary teachers. They also conduct inservice training sessions at their schools and other schools throughout the district and state.

Each Math Lead Teacher dedicates every Monday night for two years to completing 300 clock hours of course work and receives graduate credit toward certification as a math specialist. Topics of instruction include MathTools, AIMS (Activities Integrating Math and Science), MCTP (Australian Teacher Training), NCTM (membership and training), computer use, cooperative learning, current practice in mathematics education and research, and mathematics content.

In support of the program, parent, community, and local schools supply funds for math manipulatives and subsidize teacher attendance at professional meetings. Volunteers help with the preparation of student activities.

In addition to providing teachers opportunities to assume leadership roles, this approach to staff development takes advantage of community resources, including university faculty who provide instruction tailored to Math Lead Teachers, community funding sources to help support professional development, and volunteers who help teachers prepare lessons.

Goals

The program's primary goal is to improve mathematics education for all elementary school students, including special needs students. This objective is accomplished by designating 20 elementary generalist teachers as Math Lead Teachers at 11 elementary schools; providing lead teachers at least 18 hours of course work in mathematics, research in mathematics education, and elementary mathematics methods; and ensuring that all courses follow guidelines for mathematics education provided by the University of Chicago.

Effectiveness

Results of a survey administered at the end of the major course work in May 1992 indicate a significant increase in teacher use of manipulatives as well as teachers' feelings of empowerment in mathematics. In addition, a random sampling of mathematics lessons showed that students were actively involved in mathematics more than 50 percent of the time. Teachers were lecturing, using the overhead projector, and dominating class discussion only 25 percent of the time, as compared to 85 percent of the time prior to the implementation of the program. Mathematics has become a critical part of education of each elementary school, ranking above or equal to reading as a major content area.

Environmental Science Seminar

Programs of Excellence

Environmental Studies

Rick Tully
Resource Teacher
Lee County Schools
2055 Central Avenue
Fort Myers, FL 33901
(813)275-3033

Grades 11-12

Program Description

The Environmental Science Seminar is a program offering high school juniors and seniors classes in environmental science research. The program is designed to increase students' knowledge and understanding of science and to develop the participatory skills necessary to be effective citizens.

During the classes, which meet bi-weekly, students engage in action research and service projects in the community. Classes are taught by teams of two teachers. The program uses an interdisciplinary block schedule, which enables students from seven public high schools and one parochial school to participate in the classes. Large blocks of time are organized in a modular format to foster student immersion into a topic. Students study environmental issues and work in cooperative groups to produce action research projects.

Under the direction of the Lee County, Florida, Environmental Education Department, government and business leaders serve as mentors for students, teach segments of the program, and provide extensive technical expertise. Many have also provided financial contribuions to support projects and national and international study.

A unique feature of the Environmental Science Seminar is that it uses environmental issues to actively engage students in the democratic process. It involves a large number of very intelligent students who are perceived to be engaged in "negative leadership" activities within their schools and teams them with other student leaders to encourage positive behavior. Students can also serve as peer teachers and teacher assistants who help with class projects and activities.

The program, which is 22 years old, is never the same two years in a row. A common set of skills and core knowledge is expected to be mastered by students each year. However, when students design their yearly project, the program is lead in different directions based on their interests and needs.

Goals

The program is based on the assumption that students learn best when they are partners in setting educational goals. High quality work is expected of students. Students learn skills and concepts that are relevant to their lives, and mentor relationships are established to facilitate successful learning experiences.

The annual goal for every class is for each student to contribute to the completion of the class action research project. To that end, students are expected to demonstrate mastery of a set of core skills and basic knowledge that enable them to make a contribution to the effort. They are also expected to communicate what they have learned and how they feel about their own capacity and the capacity of the class group to solve problems.

The four major objectives of the Environmental Science Seminar are that students will

1. be able to construct their own knowledge and then demonstrate their understanding by transferring applications to new contexts and situations;
2. assume responsibility for their own learning and set high expectations for their accomplishments;
3. be given opportunities to practice essential skills; and
4. complete the process of action research with the assistance of a mentor.

Effectiveness

A large percentage of students participating in the seminar have gone on to successful careers in science- and environment-related fields. The program has extremely high credibility in the community. To illustrate, when the Lee County School Board was considering budget cuts in all educational programs, the CEOs of the two largest local business firms and the chair of the Lee County Commission testified that, if the funding for the Environmental Science Seminar program were cut, they would help raise funds to continue the program and even pay teachers' salaries if necessary. Fortunately, the school board was able to fund the entire Environmental Education program.

The program has been adapted successfully by many other teachers. The action research, leadership models, conflict resolution strategies, research skills, and political action skills are the components most often replicated.

The Hayes Cooper Center for Math, Science, and Technology

Programs of Excellence

Elementary Mathematics
Elementary Science

Program Description

The Hayes Cooper Center is a magnet elementary school emphasizing mathematics and science. It is located in the Mississippi Delta, which is the poorest region of the poorest state in the nation. Despite its rich natural resources, the Delta suffers from high rates of unemployment and illiteracy and, in many cases, a seemingly hopeless cycle of poverty, broken families, joblessness, and under-education. To help end this cycle, the Cleveland School District created the Hayes Cooper Center for Math, Science, and Technology to give all students, regardless of race, family background, or economic status, the learning tools and the student-centered instruction they need to succeed. By maintaining a 50:50 racial balance between black and white students, the Center has also answered the need to draw white students back from private and parochial schools to provide a multicultural learning environment for all students.

To prepare students for the 21st century, the school emphasizes the importance of mathematics and science as fields of study. Students at Hayes Cooper learn that mathematics is a practical part of everyday life by working with manipulatives, completing other hands-on activities, and using mathematics in understandable applications. Instruction at the Center also ensures that every student gets first-hand experience with the world of science. Students conduct experiments instead of only reading about them in textbooks and conduct observations of the world just outside the classroom door. Every student also becomes computer literate and studies a foreign language.

Technology—including computers, multi-media workstations, satellite hook-ups to long-distance learning sources, closed circuit television, and innovative science equipment—enhances classroom instruction and enables students to expand their imaginations. Computer programs diagnose students' academic deficiencies or needs for enrichment in various subject areas and then present individualized learning activities. When the student has completed practice activities, the integrated learning system evaluates his or her achievement by comparing the student's performance with Center, district, and state mastery objectives.

Because the Hayes Cooper program emphasizes innovative teaching methods, computer-assisted instruction, and hands-on science and math instruction, its teacher training program is crucial to the success of the

Lea Anne Brandon
Information Specialist
Jerry L. Kitchings, Ph.D.
Principal
Route 1, Box 3
Highway 61, North
Merigold, MS 38759
(601)748-2734

Grades K-6

program. Extensive technical advice in integrating computers into the curriculum is provided by computer companies, state department of education experts, and university professors.

Hayes Cooper has benefited from extensive community support. Delta State University has provided many hours of technical assistance in curriculum development and staff training. Local businesses have donated materials, supplies, and technical advice; many have also invested manpower by "lending" professionals to the classrooms as guest teachers and speakers. One industry, which has volunteered as a business sponsor of the school, donated two school buses to the new school. A health care-related business donated scientific equipment and supplies.

Goals

The overall goal of the Hayes Cooper Center is that every student will progress academically every day. The Cleveland School District has determined that the school's collective success should be measured in terms of national and international goals instead of shooting at a mark somewhere around the state average.

The Center also seeks to eliminate minority isolation in the Cleveland community at the elementary school level. Cultural diversity is, therefore, studied and celebrated, and individuals' unique backgrounds, interests, goals, and desires are emphasized. Related objectives include

1. reducing the disparity in academic achievement between minority and non-minority students on standardized tests;
2. promoting student mastery of personal computing by integrating technology into every academic subject and by teaching all students, beginning in kindergarten, the basics of computer programming and keyboard skills;
3. broadening students' knowledge and understanding of science through a hands-on laboratory that supplements regular classroom instruction; and
4. strengthening students' mathematical skills by providing individualized instruction using technology.

Effectiveness

Hayes Cooper students have scored well above the national and state averages on the Stanford Achievement Test and consistently higher than other students in the district. The Center has also been able to reduce significantly the disparity in academic achievement between black and white students in all areas; in fact, black students at Hayes Cooper have outscored all students comprising a control group of students attending other schools in the district.

Integrating Technology Into Elementary Math & Science (InTech)

Programs of Excellence

Elementary Mathematics
Elementary Science
Technology

Catherine Raymond
Education Program Manager
Miami Museum of Science
3280 South Miami Avenue
Miami, FL 33129
(305)854-4247 ext. 224

Judy Chen, Ed.D.
Director of Education
Miami Museum of Science
(305)854-4247 ext. 246

Grades K-6

Program Description

Elementary InTech is a "train-the-trainer" staff development model that prepares science and technology specialists to help teachers use technology more effectively in elementary math and science instruction. Prospective trainers participate in a three-day InTech Institute where they learn to conduct teacher inservice workshops on the use of simulation software, optical technologies, probeware, and database technology in the classroom. The program's *Trainer's Resource Guide* provides step-by-step directions for conducting teacher inservice workshops.

Elementary InTech was developed in 1991 by the Center for Excellence in Mathematics, Science, and Technology at the Miami Museum of Science through the Florida Department of Education's Instructional Technology Inservice Program.

In large part, Elementary InTech has been successful as a staff development program because it

1. requires a minimum amount of hardware;
2. emphasizes a problem-solving investigative format;
3. focuses on how technology can be used as a tool by both students and teachers, not on the use of technology as an end in itself;
4. models a variety of instructional strategies and methodologies; and
5. changes the trainer's role from that of an "expert" to a workshop leader who facilitates hands-on learning.

Goals

Elementary InTech's primary goal is to help districts train elementary classroom teachers to implement technology as an instructional tool in the math and science curriculum. Related objectives include establishing a network of leaders who share expertise in the use of new technologies; providing an innovative technology training model that can be successfully adapted and replicated; and producing a resource training manual to

support the adaptation and replication of the program.

Effectiveness

During the 1991-1992 school year, over 200 educators participated in Elementary InTech trainer institutes. Elementary InTech trainers, in turn, delivered program overviews to 724 educators, district-wide training to 851 educators, and school-wide training to 268 educators.

Regarding *Elementary InTech*'s effectiveness, a third-party formal evaluation concludes: "The data are clearly indicative of the positive impact that the training has had on participants. Trainers seem excited by the possibilities of applying and extending the training. The high quality of the training and materials are unanimously acknowledged by all participant groups."

Marietta Hands-On Math

Elementary Mathematics

Programs of Excellence

Jo Ann Crimm, Ed.D.
Marietta City Schools
145 Dodd Street
Post Office Box 1265
Marietta, GA 30061
(404)422-3500

Grades K-5

Program Description

Marietta Hands-On Math is an instructional program in which manipulatives are used to introduce elementary school children to mathematics at the concrete level. Consistent with the adage, "I hear, I forget; I see, I remember; I do, I learn," the program is based on the belief that children learn through experience.

Teachers who participate in the Hands-On Math program are given a variety of concrete manipulatives, such as interlocking cubes, pattern blocks, and base-ten blocks suitable for their grade levels. They are also provided staff development training on how to use the manipulatives most effectively. The one-day training session introduces teachers to the philosophy of the Hands-On Math program and a variety of effective uses of manipulatives in classroom activities.

The program promotes hands-on teaching strategies by providing teachers with necessary materials, training, and support. It is appealing to teachers because the Hands-On Math model is easily integrated into the existing curriculum and the instructional techniques can be immediately transferred to the classroom. The program does not require teachers to complete extensive staff development training, adjust to a new curriculum, or create a vast amount of learning materials. Equally important, its flexibility appeals to reluctant teachers by enabling them to participate at their comfort levels and to enthusiastic teachers by accommodating their desires for innovation and change.

Goals

The basic goal of the Marietta Hands-On Math program is to demonstrate that the systematic use of concrete manipulatives during mathematics instruction improves children's concept development, problem-solving skills, and computation abilities as measured by achievement tests. Two additional goals are to show that adequately trained teachers armed with proper materials can improve mathematics instruction and that students in the classes of such teachers engage in significantly more hands-on learning activities than students in a traditional classroom.

Effectiveness

To assess the effectiveness of the Hands-On Math program, the use of manipulatives was monitored through classroom observations, and pre- and post-treatment math achievement test scores were collected for

Marietta students. This evaluation showed a great increase in the use of manipulatives in classrooms as well as significant improvement in achievement test scores of Marietta students.

In 1988, Marietta Hands-On Math was validated as an Innovation Program by the Georgia State Department of Education. As a result, over 100 school systems in the state have implemented the Marietta Hands-On Math program.

Microchemistry

Chemistry

Programs of Excellence

Jacqueline K. Simms
Teacher

J. Emory Trawick
Principal
Sandalwood High School
2750 John Prom Blvd.
Jacksonville, FL 32246
(904)646-5100

Grades 9-12

Program Description

Microchemistry students at Sandalwood High School study the composition, structure, properties, and reactions of matter by examining minute quantities of materials. Instead of experimenting with milliliters of mixtures in beakers and test tubes, they conduct experiments on drops of mixtures in small spot plates. Accessible to all students, microchemistry is used in physical science courses as well as chemistry courses. It is also used to study technological and consumer issues in laboratory experiments in which students analyze recycled metals, water, and common products.

In a departure from typical laboratory experiments in which students merely verify already-established conclusions, microchemistry experiments include activities requiring students to identify unknown chemicals from their properties. Many concepts in microchemistry are taught through student investigation instead of the usual lecture-laboratory format, and, because most lessons are inductive and investigative in nature, the teacher serves as a facilitator instead of a lecturer. The small scale of microchemistry also permits a flexibility in instruction that is not otherwise possible, and many laboratory experiments can be conducted at a student's desk.

The small-scale work and flexibility of desk-top chemistry is faster and less expensive than traditional chemistry. Within a single classroom period, students can collect, process, and analyze data and conduct repeated experimentation within a fifty-minute class period. Microscale experiments can be accomplished with inexpensive plastic droppers and plates, with small amounts of chemicals, and at student desks, making microchemistry courses much more cost-effective.

The basic equipment in microchemistry laboratories includes spot plates, plastic microliter plates and strips, plastic transfer (Beral) pipettes, mini ice-cube trays, plastic audio tape boxes, and small conductivity testers. Student laboratory sets consist of several small (one inch high) enclosed droppers in a plastic cassette box or mini ice-cube tray. Instead of being discarded, "disposable" supplies and equipment are reused. Pipettes, for example, are modified for use as dropping bottles, funnels, and gas collection devices. All students wear goggles and appropriate laboratory attire.

Goals

Despite its small scale, microchemistry enables science instruction to reach a remarkable level of depth; it also enables science teachers to

achieve the primary goals of chemistry courses, namely developing skills of scientific inquiry through laboratory investigations, using chemicals and equipment that meet safety standards, and fulfilling state curricular requirements.

Effectiveness

The Microchemistry program has given Sandalwood students, who represent all socioeconomic backgrounds and include minorities and students with physical handicaps, the opportunity to conduct microscale laboratory experiments. Assessments of student performance in microchemistry indicate great improvement. The passing rate on district tests is almost 100 percent, and Advanced Placement students achieved an 89 percent passing rate in 1991. Money spent for chemistry supplies has also decreased significantly.

The Microchemistry laboratories have also been much safer for students, teachers, and the environment. Exposure to harmful substances has greatly decreased since open beakers of chemicals are no longer used, reactions are done in small spot plates instead of test tubes, and much smaller quantities of chemicals are used. The same has been true for waste disposal in microchemistry classes, which is about one-tenth of that for traditional chemistry courses.

Sandalwood faculty have created new laboratory activities, redesigned traditional labs to microscale, and employed many of the excellent materials developed by high school teachers at the Woodrow Wilson Chemistry Institutes. They are also sharing microchemistry techniques with their colleagues through a teacher-teaching-teachers approach. Teachers Jacqueline Simms and Carole Bennett have compiled and presented over 40 activities in teacher-training workshops in microchemistry. Inservice sessions on manipulating equipment and setting up laboratory activities for students have also been conducted in Duval, Alachua, Seminole, and Broward Counties. Florida Community College at Jacksonville has started using microscale chemistry in its pre-nursing classes.

Mister Goodmath

Elementary Mathematics

Programs of Excellence

Michael Rooney
Teacher

Joy L. Prescott
Principal
Welleby Elementary
3230 Nob Hill Road
Sunrise, FL 33322
(305)572-1210

Grades K-5

Program Description

Mister Goodmath is a mathematics curriculum that uses technology to motivate and sustain interest in mathematics. It was initiated as part of Welleby Elementary School's efforts to improve students' critical thinking and problem-solving abilities.

Using the school's closed circuit television, Mr. Goodmath (teacher Michael Rooney) broadcasts live and pre-taped programs featuring a variety of math topics. During broadcasts, Mr. Goodmath, dressed in a lab coat decorated brightly with numbers and mathematical equations, introduces students to a new math strategy or concept. He then challenges students to solve the problem of the week for their grade level. The students communicate their solution in letters written in proper friendly or business letter formats and mailed to Mr. Goodmath in the school's intramail system. Students who solve the mathematics problem of the week receive special recognition from Mr. Goodmath and school administrators.

Mr. Goodmath also makes live appearances in classrooms at the request of teachers. He presents lessons that parallel the objectives being taught by the teacher and that are designed to enhance and motivate students. In a particularly innovative use of technology, Mr. Goodmath videotapes himself working with students who are experiencing difficulty with math. These videotapes are then made available to the child's parents and teacher through a library checkout system.

Another innovative feature of the Mr. Goodmath program is peer tutoring by a cadre of high-achieving fifth graders (a.k.a. Goodmath Kids), who are available to help students at the request of their teachers. In another type of peer tutoring, the Goodmath Kids also appear with Mr. Goodmath in videotaped Goodmath programs broadcast to classrooms on request. These programs feature problem-solving strategies not found in students' texts.

An important role of the Mr. Goodmath program is helping teachers become more comfortable with mathematics and improving teachers' competency in mathematics instruction techniques. For example, to enable teachers to tailor math lessons for students of all learning styles, the program introduces teachers to a variety of computational systems and problem-solving strategies not readily found in textbooks.

Goals

The philosophy behind the Mr. Goodmath program is that students can become most proficient in mathematics when they learn critical thinking and problem-solving skills. Accordingly, the program

teaches specific problem-solving strategies and attempts to compensate for the limitations of basal textbooks while accommodating differences in student learning styles.

Effectiveness

The effectiveness of the Mr. Goodmath program has been demonstrated in several ways. Scores on the Iowa Test for Basic Skills indicate large gains by students in all three mathematics sub-tests: numeration, computation, and problem solving. Formal and informal surveys also indicate that teachers, students, and parents have more positive attitudes toward mathematics.

Mister Goodmath has been recognized as an exemplary program at the Florida Counsel of Mathematics Teachers Convention for the past five years. It was also honored at the Florida Principal's Leadership Convention in 1990 and the Learning Magazine/Michigan State University School of Education's Symposium in Detroit in 1991. Information on the program has been requested by the Teacher's Laboratory, Inc., the Foundation for Advancements in Science Education, and teachers throughout the U.S. and Canada.

North Carolina Project for Reform in Science Education

Integrated Science

Programs of Excellence

Program Description

The North Carolina Project for Reform in Science Education (NCPRSE) is a research-based, teacher-tested science curriculum. It introduces students to science concepts, principles, and laws at a concrete level through direct experiences with phenomenon and then to successively higher levels of abstraction. NCPRSE is part of a nationwide initiative to provide meaningful science experiences in biology, chemistry, earth science, and physical science for every student in grades six through eight.

Following the guidelines of the National Science Teachers Association and the American Association for the Advancement of Science, NCPRSE features an interdisciplinary approach to instruction, the continuity of a spiraling curriculum, hands-on activities, and assessment across grade levels. Cooperative learning and communication are also stressed as students work together to solve problems through the processes of discovery, analysis of data, and interpretation of findings. As facilitators of learning, teachers use open-ended questions to guide students through the learning process and encourage students to understand concepts rather than memorize facts.

Goals

Motivated by falling test scores, declining economic competitiveness, and a lack of student understanding of basic scientific concepts, North Carolina educators, like other educators, are reassessing traditional instructional strategies. They are finding that, rather than being studied in isolation, science concepts are best understood when logically linked with each other and with practical applications. Therefore, the goal of the Project for Reform in Science Education is to develop a science curriculum that effectively balances the teaching of concepts in middle school biology, chemistry, earth science, and physical science with practical applications. Because the Project for Reform is based on the axiom that all children can learn, its ultimate goal is to give all North Carolina children the opportunity to excel in science.

Effectiveness

The University of North Carolina at Greensboro is evaluating NCPRSE. Data are collected through teacher interviews, student interviews, student performance on the North Carolina Science Test, and student scores on performance-based items measuring content knowledge and skills

Jerry L. Everhart
Inservice Coordinator
Department of Science Education
357 Flanagan Building
East Carolina University
Greenville, NC 27858
(919)757-6736

Charles Coble, Ph.D.
Professor
School of Education
Speight 154
East Carolina University
Greenville, NC 27858
(919)757-6172

David Andrews, Ph.D.
Professor
School of Education
King Hall, Room 211
University of North Carolina at Wilmington
Wilmington, NC 28403-3297
(919)395-3381

Grades 6-8

acquisition. Preliminary test results indicate that the students generally meet or exceed expectations on locally developed and standardized tests.

Replication of the program has been successful in each of 12 field test sites, and the response by students, teachers, parents, and administrators has been extremely positive.

A Problem-Solving Approach to Mathematics Instruction

Pre-Algebra
Algebra I

Programs of Excellence

Cynthia W. Wilkins
Teacher

Ann Knight, Ph.D.
Middle School Principal
Northwest Rankin
Attendance Center
9201 Highway 25
Brandon, MS 39042
(601)992-1329

Grades 6-8

Program Description

A Problem-Solving Approach to Mathematics Instruction is an instructional program in which middle school students explore concepts through manipulatives, games, group activities, application projects, and other hands-on activities. It promotes problem-solving skill by helping students analyze underlying mathematics principles and gain confidence in their abilities.

The Problem-Solving Approach is designed for seventh and eighth graders enrolled in pre-algebra or Algebra I courses who have above average abilities in mathematics but have not acquired the skills necessary for success on the SAT and ACT college admission tests and in future careers (study skills, logical thinking strategies, or understanding of algorithms they have memorized).

The students complete daily, weekly, and quarterly mathematics assignments. Tests are comprehensive and include open-ended questions. Students are required to analyze their test errors and prepare written explanations for them. Portfolios representing the year's content display student insights, opinions, and understanding of the various topics.

Materials and curricular resources for the program are minimal. Work problems are taken from various sources, especially the monthly calendar problems in *Mathematics Teacher*. Manipulatives are also available from many sources and many can be teacher-made.

The methods used in the Problem-Solving Approach to Mathematics Instruction program are based on the National Council of Teachers of Mathematics' professional standards for structuring the classroom, selecting instructional activities, and organizing the teaching day. Whenever possible, manipulatives, games, and group activities are used to introduce new concepts to the students and to help them explore multiple solutions. Topics are taught in an overlapping manner, with new topics being introduced while current topics are still being mastered and old topics reviewed. Working in groups, students discuss their strategies, solutions, and problems with each other and with the teacher. Enrichment activities related to course concepts are woven into the curriculum, and examples from other courses are used to illustrate current content.

Students demonstrate their comprehension of mathematics concepts with a class log, daily journal, and portfolio. Weekly progress reports are

given to the students, and teachers frequently contact parents to keep them apprised of their children's progress.

Because most textbooks do not focus on problem-solving skills and finding appropriate problems and enrichment activities is difficult, teachers at Northwest Rankin required additional training in presenting mathematics instruction with a problem-solving focus. They were also provided staff development training demonstrating alternative assessment techniques, hands-on activities, and effective uses of manipulatives.

Goals

The goals of the Problem-Solving Approach to Mathematics Instruction are to teach students to

1. understand mathematics concepts,
2. select and use available tools and technology appropriately,
3. communicate orally and in writing their processes for solving mathematical problems,
4. develop confidence in their ability to solve problems, and
5. transfer mathematics applications to other subjects.

Effectiveness

In the pilot year of operation, students taking the Mississippi Subject Area Test in Algebra I posted a significant increase ($p < .05$) in test scores on concepts taught with the problem-solving approach. Students were presented with concrete, visual, graphic, and abstract methods for solving problems and were allowed to select the method(s) they preferred. Since then, students have demonstrated improved abilities to select and use appropriate problem-solving strategies.

Interviews with former students indicate that skills learned through the problem-solving approach are retained and applied in future mathematics courses. After observing the program, other teachers within the school have begun to incorporate many of its components, such as daily journals, games, and group activities, into their lessons. An interesting bonus of the problem of the week is that parents, especially fathers, eagerly await the new mathematics problems and enjoy solving them with their children.

The program's success has also stimulated a positive community response. Examples of student work have been displayed in a local bank and in the newspaper. Local business people and other community members have volunteered their time to speak to students on various topics.

Project PEAK

General Math
Pre-Algebra
Environmental Studies
Biology/Life Science
Earth/Space Science

Programs of Excellence

Anna F. Clausen, Ph.D.
Assistant Superintendent
Division of Instruction
Post Office Box 1327
Mobile County Schools
Mobile, AL 36633
(205)690-8004

Jennifer Grogan
Principal
Chickasaw School of Mathematics and Science
201 North Craft Highway
Mobile, AL 36633
(205)452-0421

Ernestine Jackson
Principal
Clark School of Mathematics and Science
50 12th Avenue
Mobile, AL 36633
(205)457-9236

Grades K-8

Program Description

Project PEAK (Permanent Equality through Academic-excellence Key) is a program featuring computer-assisted instruction in mathematics and science with an emphasis on hands-on experience and cooperative learning. It was established in 1991 at Chickasaw Elementary School of Mathematics and Science and Clark Middle School of Mathematics and Science, two magnet schools serving children in Mobile County, Alabama. Project PEAK's purpose is to strengthen students' knowledge of mathematics and science concepts and marketable skills by providing students with appropriate instruction in mathematics, science, and technology; it also seeks to prevent the isolation of minority students.

Instruction at Chickasaw Elementary, which serves grades K-3, emphasizes children's early developmental learning through discovery, the exploration of concepts, intensive phonics instruction, and a student-centered natural science museum. Clark Middle School offers accelerated mathematics and science courses for grades 4-8. All subject matter is approached through the process of scientific inquiry and supported by computer technology.

Both Chickasaw and Clark have a discovery math/science center where students develop their scientific skills in organizing, preparing, structuring, manipulating, and evaluating. Students also have the opportunity to discover, analyze, and apply mathematical concepts either individually or cooperatively.

Staff development, which is ongoing at both schools, includes workshops on cooperative learning, thinking skills, and learning strategies to enhance all areas of the curriculum. The Parent Development Committee and local Project PEAK Committees meet to provide support for the schools, and the local adopt-a-school program has sponsored various programs for teachers and students.

Goals

Project PEAK's goals are to bring together students in a challenging educational environment; to motivate children from all social, economic,

ethnic, and racial backgrounds to achieve maximum academic and vocational potential; to eliminate minority group isolation; and to provide a mathematics and science instructional program that enables students to translate theory into practical application. The program's objectives are to

1. improve students' self-esteem as measured by attitudinal surveys.
2. improve students' performance on the Alabama Basic Competency Test.
3. improve students' application of mathematical and scientific theory through simulated laboratory experiences.
4. increase the participation of minorities, females, and students with disabilities in mathematics and science-related careers by augmenting instruction with a mentoring program.
5. achieve full integration in both schools, creating an atmosphere of acceptance.

Effectiveness

In addition to achieving desegregation through countywide attendance zones, these two magnet schools are successfully achieving their academic goals as assessed by school staff, Mobile County Public School System supervisors, parent/community committees, and the Project PEAK facilitator.

Science Mentorships

Gifted Programs

Middle School Science Mentoring

Program Description

In Leon County, Florida's, Science Mentorship program, professional scientists help middle school students conduct scientific research. Gifted seventh- and eighth-grade students with an interest in science apply to work with a research scientist on a semester-long project. A resource teacher selects a field of study, identifies a local facility that conducts research in the selected field, and enlists scientists to work with one or two students for two hours each week. Interested students and mentors are matched to collaborate on a project that will extend the student's knowledge about science in general and the mentor's field in particular.

After participating in an orientation session that acquaints them with the philosophy and goals of the program, the volunteer mentors acclimate the students to the laboratories and begin developing working relationships with the students. During the next several weeks, each student works on a project, assisted by a scientist. The school system provides transportation, and the mentorship sites provide necessary materials. At the end of the semester, students present their projects to parents, teachers, and researchers.

A unique feature of the Science Mentorship program is that it takes advantage of a very valuable community resource: professional scientists who are interested in being involved in the educational process. Scientists are enthusiastic about the mentoring program because their participation enables them to make an important contribution to the community and because the program portrays realistic images of scientists. Since mentorships are typically offered only to high school students, this program also presents a special opportunity for middle school students to get first-hand experience in research with the assistance of a mentor.

Goals

The goal of the Science Mentorships program is to expand students' understanding of science concepts by enabling them to participate in hands-on learning experiences with science professionals. The program also provides an individualized, self-paced program that is not possible in crowded classrooms and encourages students to consider careers in science-oriented fields.

Joan Crow
Teacher

Tom Dunn
Principal
Academic Resource Center
Lively Campus
500 N. Appleyard Drive
Tallahassee, FL 32304
(904)487-1957

Joel Dawson
Science Curriculum Coordinator
Leon County Schools

Grades 7-8

Effectiveness

The success of the program is indicated by the number of scientists who volunteer as mentors. Their only complaint is that the sessions are too short. Another positive outcome of the program is the number of students who are being offered internships and/or summer employment with various local agencies to conduct experiments or monitor projects.

Snapfinger Academy of Mathematics, Science, and Technology

Programs of Excellence

Elementary Mathematics
Elementary Science

Program Description

The Snapfinger Academy of Mathematics, Science, and Technology is a magnet school housed at Snapfinger Elementary School in DeKalb County, Georgia. It was established in 1990 in response to local, state, and national test scores indicating that American students were lagging behind their foreign counterparts in mathematics and science. In addition to improving instruction in these areas, Snapfinger Academy's purpose has been to attract more minority and female students to the fields of mathematics and science.

Snapfinger Academy features interdisciplinary instruction in mathematics and science. To foster mathematics and science skills as well as critical thinking skills, teachers conduct lessons with a guided discovery approach, using the scientific method as an integral part of the instructional process. To help develop questioning minds, science is taught as a means—not an end—and teachers use students' answers to generate more questions for the students to explore. Classes concentrate on developing higher-level thinking skills, such as presenting evidence to support conclusions. Personal and social needs are addressed through ongoing discussion of current topics in science and health. Students are encouraged to develop solutions to problems and communicate their ideas to lawmakers and scientists.

Other innovative features of the program include field trips to the Fernbank Science Center, participation in science adventures through the Science by Mail program, and involvement in the Atlanta Math project.

As facilitators of learning, Snapfinger teachers fulfill such roles as identifying applications of science content relevant to students' lives and helping students generate solutions to environmental problems. To maintain the quality of Snapfinger's program, teachers regularly attend staff development sessions on innovative instructional strategies and are trained to use state-of-the-art technology. Additionally, courses in current methods of mathematics and science instruction teach teachers how to use an interdisciplinary approach combining math and science instruction.

Snapfinger Academy is supported by a number of local organizations. As a Partner in Education, Kaiser Permanente offers diverse programs and services to students, such as the well-child clinic, the computer club,

Barry Doran
Instructional Coordinator
DeKalb County Board of Education
3770 North Decatur Road
Decatur, GA 30032
(404)297-2313

Crawford Lewis, Ph.D.
Principal
Snapfinger School
1365 Snapfinger Road
Decatur, GA 30032
(404)288-5643

Grades 4-7

the mentoring program, and Career Day speakers. Volunteers include physicians, nurses, and office and administrative personnel. To help students develop public speaking, self-discipline, and related skills, the 100 Black Men of DeKalb County organization sponsors a leadership academy for middle-grade boys and Saturday excursions to educational, cultural, and business locations throughout the area.

Goals

The Snapfinger Academy program is based on the belief that acquiring technological skills is an integral part of mathematics and science literacy and that acknowledging the influences of mathematics and science in all academic disciplines is essential to the effectiveness of schools. Equally important is the belief that each child, regardless of background or ability level, should have equal access to quality, innovative instruction.

The major goals and objectives of the Snapfinger Academy of Mathematics, Science, and Technology are to

1. promote positive student attitudes toward mathematics and science.
2. develop mathematical and science skills in "real life" situations and in multicultural settings.
3. integrate mathematical and scientific concepts into other content areas.
4. use computer technology to develop mathematic and scientific skills.
5. provide opportunities for students to set up and solve problems correctly with appropriate operations and/or a variety of strategies.
6. teach students how to read, write, and speak about mathematics and science at a level commensurate with their abilities.

Effectiveness

Since the Academy was established, scores of magnet students on the Iowa Test of Basic Skills have exceeded the scores of students in the regular school program and the country and state. Over 90 percent of the students participating in the program have elected to return.

Sold on Science

Elementary Science

Programs of Excellence

Charlotte Draper
Teacher
Sylvia Almond
Principal
Valley Elementary School
310 Opportunity Drive
Pelham, AL 35124
(205)620-1072

Grades K-5

Program Description

Valley Elementary School's Sold on Science (S.O.S.) program is a laboratory-based science program designed to develop students' thinking skills through discovery learning. It was developed to help meet the National Education Goal, "By the year 2000, American students will be first in mathematics and science," and to provide the hands-on and minds-on approach to science instruction recommended by the National Science Teachers Association.

Kits for the S.O.S. program are wooden boxes containing household items and other objects for specific experiments and observations related to instructional themes. They are "prepackaged" by parent volunteers and teachers so that students can engage in active learning with little preparation time or effort. To foster the children's natural curiosity about animals and other phenomena, "critters" (such as snakes, caterpillars, frogs, birds, gerbils, turtles, and insects) and objects (such as rocks and fossils) that the children have collected serve as the foundation of many lessons. Children work in groups of four to six at lab tables, which are equipped with microscopes and other instruments. The teacher's role shifts from "imparter" of knowledge to designer and facilitator of student-centered science lessons. The teacher guides the learning process with questioning, while students observe experiments, collaborate, and make discoveries.

Building on students' prior experiences to develop scientific thinking skills, the S.O.S. program teaches developmentally appropriate science concepts. For example, first graders learn classification by sorting and charting beans according to color and kind; third graders chart data and draw conclusions with simple experiments such as measuring the temperature of various solutions; and fourth and fifth graders dissect frogs.

S.O.S. is designed for all of the school's 805 K-5 students. Teachers and students have access to the school laboratory, and materials and kits are available for checkout so that classrooms can become mini-labs.

With the help of local funding resources, in particular the AmSouth Bank fund for educational excellence, the local Lion's Club, the PTO, and members of the community, program director Charlotte Draper has been able to establish and equip a state-of-the-art science laboratory. Although excellent materials have been purchased with grant money, many items have been donated by the community, and one parent per day volunteers as a laboratory assistant. Ms. Draper has helped prepare faculty members to use an array of laboratory tools, and two college professors have

visited the school and demonstrated effective science lessons using lab material.

Goals

The objectives of the S.O.S. program are to involve students in positive laboratory experiences through activity-oriented lessons, increase instructional emphasis on the process skills of science, present science and technology as problem-solving tools, and develop positive attitudes toward science and technology in all students but especially in girls.

Effectiveness

The S.O.S. laboratory has generated an increase in the number of activity-oriented lessons taught by teachers in grades K-5 and fostered more positive attitudes about science in students. The lab also helped integrate science, technology, and expository writing to stimulate higher levels of thinking.

S.O.S. can be replicated with limited start-up funds. Any classroom with large tables, storage shelves, and ready access to running water can accommodate an S.O.S. lab, and lab kits can be compiled from household items and other materials donated to the lab. A fund-raiser can provide money for microscopes, dissecting instruments, and other equipment.

TACO (Take A Class Outdoors)

Programs of Excellence

General Mathematics
Geometry
Trigonometry
Physics
Chemistry
Biology/Life Science
Earth/Space Science
Environmental Studies

Linda Clifton
Guidance Counselor
Booneville High School
100-B George Allen Drive
Booneville, MS 38829
(601)728-8430

Bob Harmon
Principal
Booneville High School
(601)728-5445

Grades 9-12

Program Description

TACO (Take A Class Outdoors) is an outdoor exploration program that uses the natural resources of the outdoors to enhance classroom learning. In addition to a lot near the school, TACO's outdoor classrooms have included Tishomingo State Park in Dennis, Mississippi, the Mississippi Gulf Coast, and national reserve areas in Florida. Designed especially for female students, TACO develops logical reasoning and problem-solving skills, promotes positive attitudes toward science, increases knowledge and curiosity about science, and stimulates interest in careers in science and engineering.

Each year, a two-day TACO retreat is held at a park or recreation area. Students handle snakes, study star formations, examine plants, collect insects, use geometry to measure the distance across a stream, study greenhouse effects, and drink sassafras tea. Faculty from area colleges and universities present sessions on geology, astronomy, entomology, ecology, botany, and health.

Students use various applications generated by student learning groups. For example, they might determine distances by using triangulation or establish their own units of measurement to use when measuring great distances. Students also gain experience in public speaking by making presentations about their work to local civic clubs or conducting workshops for elementary school students during the summer.

Goals

The main goal of the TACO program is to encourage young women to take upper-level science courses and consider science-related careers. Accordingly, the project promotes positive attitudes toward science, thereby increasing interest in and knowledge about scientific work.

Effectiveness

Post evaluations, journal entries, and teacher assessments of TACO have been very positive. Enrollment in the program has increased, and follow-up studies of TACO students indicate increased participation by females in science-related fields.

Since the TACO program was presented at the Women in Science and Technology Conference, many other districts have indicated an interest in replicating the program. In a speech to the Mississippi Legislature in 1992, Senator Thad Cochran cited TACO as an example of an outstanding educational program in Mississippi.

Using the Outdoors to Teach Experiential Science

Programs of Excellence

Elementary Science
Environmental Studies
Biology/Life Science

Mary Ann Britain
Director of School Programs

Betsy Bennett, Ph.D.
Director

Michael Dunn
Environmental Educator
North Carolina State Museum of Natural Sciences
Post Office Box 27647
Raleigh, NC 27611
(919)733-7450

Grades K-5

Program Description

Using the Outdoors to Teach Experiential Science is a staff development project sponsored by the North Carolina State Museum of Natural Sciences. In this program, elementary school teachers receive intensive training in the natural sciences provided by Michael Dunn, environmental educator at the State Museum. The purpose of the training is to enhance the academic performance of elementary school students by combining classroom instruction in science with studies of the outdoors.

Each year, teachers from 10 elementary schools in North Carolina are selected to participate in the program. The teachers attend workshops over the course of the school year, and the lead teacher at each school also participates in a week-long summer field institute featuring hands-on training in natural science. At the workshops, naturalists present content information in natural science, model hands-on activities and teaching techniques, and demonstrate how school grounds can serve as a natural science teaching environment.

In contrast to field trips and other off-campus programs that are too expensive for many schools or that involve only a few students, the Experiential Science program emphasizes using the school grounds as an outdoor laboratory. Teachers learn to transform the school grounds into a wildlife habitat by planting native wildflowers, shrubs, and trees; providing cover for birds and small mammals; and returning selected mowed areas to maintained meadows or natural sites. They also learn how to construct butterfly gardens, bird feeders, bird-watching observation stations, and mini-ponds for small aquatic creatures.

Over the course of the year, each school is provided the following:

1. hands-on training conducted by naturalists with each school's existing ecosystems
2. a manual with activities specific to the school site
3. a developed natural habitat
4. plants and wildlife habitats to enhance the existing environment
5. results of the evaluation measures of the project

The program also disseminates curricular products and information on the model school sites to all North Carolina schools.

The Using the Outdoors to Teach Experiential Science program answers three critical needs: the need for more training in natural science for elementary school teachers, the need for a school-based science program that is accessible to students of all ability levels, and the need for more hands-on science experiences for students. Originally developed as a district inservice project, the program has grown into a statewide collaborative between the State Museum of Natural Sciences, the Department of Public Instruction, and the North Carolina Science and Mathematics Alliance.

Goals

In addition to using an outdoor laboratory to provide teachers and students an experience-based science curriculum, the Experiential Science program seeks to increase environmental awareness, build a community of learning among teaching staff, improve teachers' and students' attitudes toward science, and increase teachers' confidence in teaching science. A related goal is creating an alliance of teachers, parents, and community members for planning and developing outdoor resources.

Effectiveness

The Experiential Science program is currently being evaluated by the Department of Public Instruction. The methodology, which will yield both qualitative and quantitative data, includes formal assessments of students' performance as well as site observations and interviews with teachers, staff, students, the business community, and parents. Preliminary data indicate that the program has had a positive impact on students' and teachers' attitudes towards experiential science.

Quality Programs

Mathematics and Science Programs

Chemistry for Elementary Teachers

Elementary Chemistry

Quality Programs

Kenneth Quinn
Superintendent
New Albany Public Schools
Post Office Box 771
New Albany, MS 38852
(601)534-1800

Linda Madden
Teacher

Wade Ivy, Jr.
Principal
New Albany Middle School
400 Apple Street
New Albany, MS 38652
(601)534-1820

Grades 6-8

Program Description

Chemistry for Elementary Teachers (C4ET) is an instructional program designed to develop intellectual skills through an orderly progression of learning activities. The program was designed as a collaborative project between the New Albany Middle School faculty and Emory Howell of the University of Mississippi in Hattiesburg.

To integrate C4ET into New Albany's science curriculum, lead science teacher Linda Madden assists participating teachers in establishing safe, unthreatening learning environments for their students. She also helps teachers design a variety of hands-on activities that meet the pedagogical needs of students of all learning styles and encourage students to explore, experiment, and evaluate.

Forty percent of the time in the C4ET program is devoted to lectures, and sixty percent is for laboratory activities. In contrast to traditional classes, students begin a new topic of study by obtaining background information from the teacher, books, films, and other resources. After discussing this information, the students participate in hands-on activities that foster thinking and process skills. Following the hands-on activity, students report what they have learned by writing about their experiences and sharing how they learned new information.

Cooperative learning is used to encourage children to become team members and learn from others. Each child is given a job to do and is accountable for group as well as individual progress. Serving as peer tutors, older students assist younger students in experimental learning activities.

Goals

The overall goal of the Chemistry for Elementary Teachers program is to make science more relevant to students by connecting science concepts with other subjects. The program also seeks to establish a foundation enabling students to understand complicated issues, such as environmental problems.

Effectiveness

In addition to pencil and paper pre- and post-tests, hands-on guided discovery is used to evaluate the program. Students are tested on their ability to use the material they have studied and to process what they have learned.

Computer-Assisted Instruction for Enrichment and Development Learning

Quality Programs

David F. Martin
Computer Lab Coordinator

William G. Hayes
Principal
Central High School
2400 Dobbs Drive
Phenix City, AL 36867
(205)298-3626

Grades 9-12

Mathematics, Algebra, Physics,Chemistry

Program Description

The Computer-Assisted Instruction for Enrichment and Development Learning program at Central High School is an instructional management system designed to provide individualized instruction, immediate feedback, and comprehensive record keeping.

The program can administer a pretest, provide individualized instruction and exercises, give immediate feedback, modify instruction automatically, and administer post-tests. Capable of accommodating a broad range of student interests, abilities, and learning styles, the program can remediate basic skills and supplement instruction with enriched learning activities.

The most impressive feature of the computer laboratory is its capabilities. Besides teaching the basics, the software can help algebra students explore such concepts as slope and positive and negative numbers. With the addition of custom-developed calculus software, advanced math students can try to fathom the limits of infinity. Science software enables science students to use the computer's probes to measure temperature, light, and pH levels. Students preparing for the Alabama High School Graduation Exam are assisted with basic skills, while the system simultaneously serves other students with enrichment activities in algebra, geometry, trigonometry, and calculus.

Math and science students are not the only students who benefit from the Computer Assisted Instruction program. Spanish classes practice language skills with software written in Spanish, and journalism students use desktop publishing to produce the student newspaper. Language arts classes use the computer lab for writing research papers with word-processing software. The school recently opened the computer lab to the community at night for adult basic education classes.

Goals

The program uses computers to provide instruction appropriate for a variety of learning styles, abilities, and interests. Objectives are to teach students to become computer proficient; foster student interest in mathematics, science, and technology; provide individualized remediation; and supplement classroom instruction with computer-based enrichment activities.

Effectiveness

The effectiveness of the program is demonstrated in the number of students served and the range of students' needs that are met.

Ecocube

Environmental Studies

Quality Programs

Paul E. Greene, Ph.D.
Science Department Chair

William E. Shotwell
Principal
Lithia Springs Comprehensive High School
2520 East County Line Road
Marietta, GA 30060
(404)732-2600

Grades 9-12

General Description

Students of Lithia Springs Comprehensive High School conduct scientific research with Ecocube, a 100 cubic foot enclosed ecosystem. Designed, constructed, and tested by students, Ecocube challenges science students with authentic learning activities.

Plant and animal specimens are placed within the sealed cube for five weeks, then experiments are conducted to test the pH level in the soil, the effects of environmental changes on plant growth, and the impact of biotic and abiotic changes on plant and animal mortality. Students operate various types of equipment, such as video cameras, computers, and drills and produce drawings, diagrams, tables, and charts.

A unique aspect of the Ecocube system is the challenge it offers students in solving problems involving design, construction, and experimentation. The integration of various fields of science, namely biology, physical science, and chemistry, gives students a unique opportunity to apply investigative skills to abstract concepts. The program requires students to think and act independently, use their individual skills and leadership abilities, and work together to attain a predetermined objective. The most important aspect of Ecocube is that a large group of students works together to take an idea through the scientific method to a final project.

Goals

In the Ecocube program, students learn science by doing science; therefore, the program's overall goal is to transform the classroom into a research laboratory. The project's objectives include providing a means for students to work together to solve a problem, increasing the students' opportunities to investigate a variety of possible approaches to a problem, allowing students to evaluate these approaches, and using the students' individual talents in a group effort.

Effectiveness

The overall effectiveness of Ecocube is measured in two ways: academic performance and student enthusiasm. In addition to improving students' performance in science, the program has been very successful in stimulating interest in science. Students are eager to come to class to check the progress of the "Cube" and discuss their work with their friends and parents. Some students indicate that they have learned more about science by being part of this research than they have learned from books or traditional laboratory activities.

Gear Up for Learning

Quality Programs

Vasha Rosenblum, Ph.D.
Enrichment Coordinator

Gloria Solomon, Ed.D.
Principal
Trace Crossings School
5454 Learning Lane
Birmingham, AL 35243
(205)985-2460

Grades 3-5

Elementary Math
Elementary Science

Program Description

Gear Up for Learning is a hands-on instructional program in which LEGO Technic resource materials are used to reinforce concepts in elementary mathematics and science. Based on the philosophy that children learn best when they are actively involved in learning, the program uses the familiar LEGO materials to engage students in learning concepts from physics, technology, engineering, numeracy, and spatiality.

In the Gear Up for Learning program, children are able to apply their prior experience and knowledge of LEGO materials to learning mathematics and scientific concepts. Because the children are actively involved in the learning process, they have a clearer understanding of the principles, mechanisms, and structures being studied.

Goals

The Gear Up for Learning program is designed to develop motor, graphing, engineering, technological, and problem-solving skills. Communication skills are developed when students participate in group discussions and exchange ideas on the best ways to build and test their models, and creative thinking skills are also fostered as the students design and build mechanical models.

Effectiveness

In addition to promoting scientific and technological literacy as children learn important concepts from mathematics and physical science, the Gear Up for Learning program enables students to exhibit talent in mechanics, construction, and invention that is not often recognized in traditional courses. The positive impact of the program is evident in the satisfaction that students express with their experiences, their projects, and the recognition their creativity receives. Further evidence of the effectiveness of the program is in the replication of the curriculum by teachers of other classes.

Homestyle Learning

Elementary Math

Quality Programs

Ann Harsh, Ph.D.
Early Childhood Coordinator
Hattiesburg Public Schools
301 Mamie Street
Hattiesburg, MS 39401
(601)583-3558

Tressie Harper
Principal
Jones Elementary School
Lula Street
Hattiesburg, MS 39401
(601)583-0960

Grades K-5

Program Description

In the Homestyle Learning program, teachers and parents work together to improve students' academic performance. The program builds home-school connections that are important to children in a variety of ways.

Parents attend sessions in which they learn instructional strategies that they can use at home to reinforce skills their children are taught in school. Teachers introduce parents to innovative methods and give them access to materials that promote mathematics literacy and problem-solving skills.

Homestyle Learning is designed to encourage students to draw connections between mathematics and other subject areas and to recognize mathematics in practical "real world" applications. The program integrates whole language strategies built around students' prior knowledge and experiences. It also uses children's literature and related hands-on activities to stimulate problem-solving and creative thinking skills.

Goals

The primary goal of the program is to help teachers and parents promote children's knowledge of mathematics and problem-solving skills. Specific objectives of the program are to

- teach students to value and enjoy mathematics at home and at school,
- help students become more confident in their mathematics abilities,
- encourage students to think and communicate mathematically at home and at school,
- increase parental involvements, and
- improve student mathematics performance.

Effectiveness

As indicated by their continued attendance at Homestyle Learning sessions, parents believe that the sessions are worthwhile. The results of informal surveys indicate that families believe the sessions help children improve their reasoning and problem-solving skills. Teachers have also indicated that the program has been effective in involving more parents in their children's education and in improving their children's mathematics achievement in the classroom.

Mathematics and You

Quality Programs

Susan Lockwood
Secondary Supervisor
Dothan City Schools
500 Dusy Street
Dothan, AL 36301
(205)793-1397

J. H. Woodham
Principal
Dothan High School
1000 South Oates Street
Dothan, AL 36301
(205)794-1400

P. Hardy
Principal
Northview High School
3307 Highway 431 North
Dothan, AL 36303
(205)794-1410

Grades 9-12

High School Mathematics Curriculum Framework

Program Description

Mathematics and You is a high school mathematics curriculum framework designed to stimulate interest in advanced mathematics and to increase the rate of successful completions of mathematics courses in grades 9-12. It was developed when Dothan City Schools raised the graduation requirements for mathematics from two to three credits.

The framework was designed by the district curriculum committee, which worked for a year to develop a sequence of courses that would steer more students into Algebra I and improve the successful completion rate for mathematics courses. Restructuring focused on each point determined to be a drop-out place from the mathematics program. Program changes included the addition of five courses: Foundations of Algebra, Informal Geometry, Applied Math I, Applied Math II, and Advanced Math Topics, which were added to entice more students to study mathematics all four years of high school.

The program integrates six components of mathematics: problem solving; computational skills; estimation and mental arithmetic; language development; applied mathematics; and extensive use of calculators, computers, and manipulatives for hands-on learning. These components are designed to develop mathematical power—the ability to discern mathematical relationships, reason logically, and use mathematical techniques effectively. All classes also stress practical applications of mathematics in the home and at work.

Goals

The overall goals of the Mathematics and You program are to increase student enrollment in mathematics courses, develop the mathematical abilities in students that are required in today's technological world, and prepare students for careers involving mathematics.

Effectiveness

During the first year of the program, math enrollment grew by over 300 students, requiring the addition of three new math teachers. The failure rate in Algebra I dropped from 35% to 20%, and the failure rate in the entire math program dropped 15-20%. In 1991, 57% of the graduates had completed Algebra I; in 1992, 67% of all graduates had completed Algebra I, a trend that is expected to continue. From 1991 to 1992, the percentage of students taking the ACT rose, and their scores also increased significantly.

Opening the Gate

Pre-Algebra, Algebra I, Algebra II

Quality Programs

Edward A. Brown III, Ph.D.
Director, Special Projects
Pinellas County Schools
301 4th Street, SW
Largo, FL 34649
(813)588-6299

Suzanne Davis
Program Coordinator
Pinellas County Schools
(813)588-6117

Grades 6-12

Program Description

Opening the Gate is a research-and-development project in which mathematics teachers develop, test, and share pre-algebra activities with other mathematics teachers. The purpose of the activities is to introduce students to algebraic thinking before they enroll in the traditional high school algebra sequence.

Opening the Gate was developed by a team of Florida teachers who design and fieldtest pre-algebra activities in their classrooms. The activities, which follow guidelines established by the National Council of Teachers of Mathematics, emphasize mathematical thinking, reasoning, problem solving, and communication.

The teachers also established the Opening the Gate Network for mathematics educators from around the state and nation. At the invitation of the network, teachers submit pre-algebra activities to the project. Other teachers are invited to try the activities in their classrooms, discuss their successes, and suggest ways to improve or adapt the lessons for different courses. The network distributes the final version of the activities to network members.

The network publishes a resource manual with proven, effective classroom activities developed by teacher members of the Opening the Gate Network. Activities in the manual are keyed to project objectives, list the resources needed, describe the strategies used, and assess ideas generated by the activities. The manual also includes a listing of commercial products keyed to project objectives.

Goals

Opening the Gate's overall goal is to promote algebraic thinking by middle and high school students before they enroll in Algebra I. A second goal is to restructure Algebra I and Algebra II courses to include experiential learning through concrete applications. The program's ultimate goal is to increase the number of students who complete Algebra I and Algebra II successfully.

Effectiveness

The effectiveness of the project is already being demonstrated by the enthusiastic participation of teachers throughout the state who have developed or are piloting pre-algebra activities in their classrooms. The long-range effectiveness of the program will be determined from the number of students enrolled in formal Algebra I and II courses and the number of students who successfully complete college-prep mathematics courses.

Scholastic Chess

Quality Programs

Vasha Rosenblum, Ph.D.
Enrichment Coordinator

Gloria Solomon, Ed.D.
Principal
Trace Crossings School
5454 Learning Lane
Birmingham, AL 35244
(205)985-2460

Grades K-5

Elementary Mathematics, Logic

Program Description

Scholastic Chess is an enrichment program that helps children improve their thinking abilities by playing chess. It was developed by teacher Vasha Rosenblum of Trace Crossing School to challenge elementary students and to stimulate critical thinking skills.

During the school year, three groups of students meet once a week to play chess and discuss chess strategies. As they play chess, the students apply such critical-thinking and problem-solving skills as spatial reasoning, remembering how pieces are moved, planning ahead, considering options and consequences, and shifting the locus of control from player to player. During classroom instruction, they draw parallels between the high-level thinking skills required during a chess match and the critical thinking required for academic subjects.

Researchers have suggested that a link exists between chess skills and mathematics skills, indicating that playing chess helps develop and strengthen higher levels of thinking skills. For example, a study of the New York City Schools Chess Program suggests that chess can improve cognitive abilities, rational thinking, and reasoning in students with very weak skills. The program is also credited with improving the school environment by decreasing the incidence of suspensions and fights.

Goals

The goals of the Scholastic Chess program are to bring out latent abilities of students that are not reached by traditional education while providing students of all abilities an opportunity for cognitive and social growth. To those ends, the program seeks to enable students to develop critical thinking skills in a nonacademic activity and to achieve success in areas that do not rely on such academic skills as an ability to memorize answers and write neatly. It also gives all students an opportunity to succeed.

Effectiveness

Anecdotal information from classroom teachers, instructional support staff, and special education teachers indicates that the students participating in Scholastic Chess exhibit improved logical thinking and social interactions. Teachers' feedback also indicates that the students who experience success with chess have increased self-confidence and excel at instructional problems involving analytic thinking.

Schoolyard Habitat-Sudduth Nature Area

Elementary Science, Environmental Studies, Biology/Life Science

Quality Programs

Joan Butler
Principal
Sudduth Elementary School
Greenfield Drive
Starkville, MS 39759
(601)324-4150

Grades K-5

Program Description

The Sudduth Nature Area is a habitat located at Suddeth Elementary School. It was created to enable nearly 350 K-5 students to observe nature daily and to teach the students and the surrounding community about environmental issues.

Students from nearby Millsap Vocational school and members of the Oktibbhea County Co-op designed and constructed the small habitat, complete with a pond. In the habitat, a variety of plants attract butterflies, birds, and squirrels. Students can closely observe the daily living habits of small mammals and of birds at birdfeeders and birdbaths. The pond serves as a home for plants, frogs, turtles, and fish.

The Sudduth Nature Area capitalizes on early learning and broadens this knowledge with hands-on studies of the environment, including preservation and conservation. Children watch plants grow from seeds, tadpoles turn into frogs, mother rabbits bear and care for their young, and birds build and make homes in nests. After students observe the plants and animals, they have an opportunity to read and write about what they saw. They can also use observations to confirm what they predicted would happen.

To maintain the habitat, families and other community members collect and sell aluminum cans to raise funds, and classes rotate responsibility for caring for the nature area.

Goals

The overall goal of the program is to foster students' appreciation of nature by giving them first-hand experience with plants and animals and by teaching students the importance of recycling and other conservation efforts. Other objectives of the program are to teach the students to identify the various species of birds attracted to the nature area, to learn the proper care for plants and animals, and to participate in efforts to protect the environment.

Effectiveness

The program's effectiveness is evidenced by teacher, parent, and student involvement; attendance at workshops and other science-related activities; interest in the recycling project; students' oral and written reports about their experiences; and the incorporation of environmental issues into classroom activities and projects.

Science/Math Integration Through Applied Academics

Quality Programs

Johann Corry Kucik
Tech Prep Counselor

William G. Hayes
Principal
Central High School
2400 Dobbs Drive
Phenix City, AL 36867
(205)298-3626

Grades 9-12

General Mathematics, Algebra, Biology, Chemistry, Physics

Program Description

The Science/Math Integration Through Applied Academics program at Central High School applies the principles of Tech Prep, a federally funded initiative designed to promote technology education. Tech Prep involves parents, students, educators, and business and industry in elevating the academic expectations of the middle 50 percent of students.

The program is designed to meet the needs of students with a variety of learning styles. The student-centered approach includes cooperative learning to strengthen each student's ability to collaborate and communicate technical concepts. Instruction features "real world" applications that are designed to expand students' knowledge and prepare them for future job opportunities in mathematics and related fields. The new "applied" curriculum in math, biology, chemistry, communications, and physics presents college prep competencies such as algebra, problem-solving skills, and critical-thinking skills in average classes.

The successful implementation of the new curriculum has been due, in large part, to the extensive staff development designed to help teachers adapt to the new teaching styles, focus more on practical applications than theories in their courses, and practice team-building strategies. An outgrowth of the team-building seminars has been the development of interdisciplinary projects involving teachers and students from academic and vocational areas.

Goals

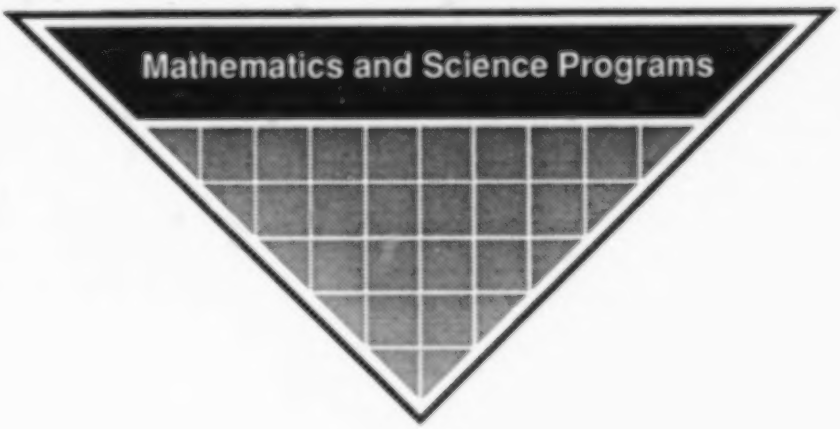
The Applied Academics program aims specifically at developing college prep competencies in average-track high school students. The program also seeks to enhance students' understanding of mathematics concepts and improve their performance on mathematics achievement tests.

Effectiveness

Since the introduction of Tech Prep and the new applied courses, enrollments in math and science courses at Central High School have been rising steadily; 82 percent of the students now take science, and 98 percent of the students are enrolled in a math class. Another indicator of the program's quality is the number of visitors referred to Central High School by the State Department of Education.

Promising Programs

Mathematics and Science Programs



Elementary Hands-On Science

Promising Programs

Elementary Science

Bruce Daniels, P.D.
Assistant Superintendent
201 South Green Street
Tupelo, MS 38801
(601)841-8850

Paul Pate, Ph.D.
Principal

Minnie Leeper
Teacher
Lawhon Elementary School
140 Lake Street
Tupelo, MS 38801
(601)841-8911

Grades K-5

General Description

Elementary Hands-On Science is an instructional program designed to nurture children's curiosity about science. In this approach, students conduct experiments with rocks, fruit, common household objects, and other materials that demonstrate the relationship of science and technology to "real life" situations.

Students develop critical thinking skills by applying the scientific process, and lessons build on students' prior experiences and knowledge. The program features a thematic teaching approach and developmentally appropriate materials designed to accommodate a variety of learning styles. It also offers opportunities for individualized instruction as well as cooperative activities with the teacher serving as a facilitator of learning.

Goals

In addition to encouraging young students' curiosity about science, the Elementary Hands-on Science program seeks to create an engaging classroom climate in which student success is recognized, rewarded, and celebrated.

Effectiveness

By applying research-endorsed instructional methods, Elementary Hands-On Science is helping students master advanced science skills. Because they have opportunities to tap into their unique skills and talents and to have their achievements recognized, students' attitudes toward science also improve.

Teacher Helping Teacher

Promising Programs

Brenda Spearman
Teacher

Betty Rutledge
Teacher

Mickey Murphy
Principal
Tupelo High School
2500 Cliff Gookin Blvd.
Tupelo, MS 38801
(601)841-8970

Grades 9-12

Geometry

General Description

Teacher Helping Teacher is a peer review program developed to help classroom teachers improve their instructional techniques. The brainchild of Tupelo High School teachers Betty Rutledge and Brenda Spearman, the program works as a partnership between a classroom teacher and a resource teacher.

The peer review is conducted as a modified role play, with the resource teacher assuming the role of student while the classroom teacher presents a lesson. At the conclusion of the lesson, the resource teacher provides the classroom teacher feedback on the lesson, identifying strengths and suggesting strategies that might improve the lesson. For example, the resource teacher might recommend instructional techniques that better accommodate student learning styles.

The Teacher Helping Teacher process is an example of the important contributions that resource teachers can make in classrooms. Such a program offers immediate feedback to classroom teachers from a peer who is accessible on a daily basis and who can provide practical suggestions on how a lesson can be developed to enhance student learning.

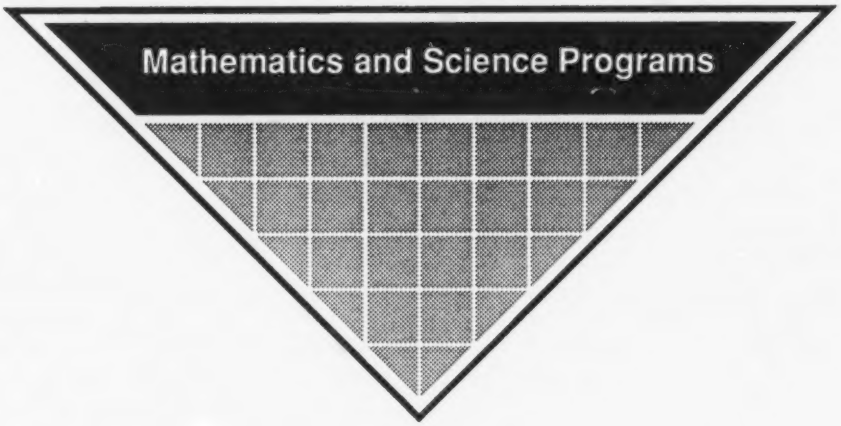
Goals

The ultimate goal of the Teacher Helping Teacher system is to ensure that instruction is appropriate for all students and that every student has the opportunity to succeed at his or her highest possible level.

Effectiveness

Assessments of student participation, behavior, and performance indicate that the peer review process is effective in improving instruction. Another valuable feature of the program is that it can be replicated easily.

National Diffusion Network



ABOUT THE NATIONAL DIFFUSION NETWORK

Administered by the U.S. Department of Education, the National Diffusion Network (NDN) identifies exemplary educational programs across the nation and validates them through a rigorous evaluation process. The NDN then "diffuses" or distributes information about the programs to public and private schools, colleges, and other institutions. This document contains descriptions of NDN programs in mathematics and science.

As part of NDN services, each state recieves a grant to support the work of a facilitator who matches school needs with the best educational practices. The NDN facilitators for the Southeast are as follows:

NATIONAL DIFFUSION NETWORK STATE FACILITATORS

ALABAMA

Maureen C. Cassidy
State Facilitator
Alabama Department of Education
Room 5069
Gordon Persons Building
Montgomery, AL 36130
(205)242-9834
FAX (205)242-9708

GEORGIA

Frances Hensley
State Facilitator
University of Georgia
607 Aderhold Hall
Athens, GA 30602
(404)542-3332 or 542-3810
FAX (706)542-4032

NORTH CAROLINA

Linda G. Love
State Facilitator
North Carolina Department of
Public Instruction
Division of Development Services
116 West Edenton Street
Raleigh, NC 27603-1712
(919)715-1363
FAX (919)715-1204

FLORIDA

Judy Bishop
State Facilitator
Florida Department of Education
325 West Gaines Street, Suite 424
Tallahassee, FL 32399
(904)487-6247
FAX (904)488-6319

MISSISSIPPI

Bobby Stacy
State Facilitator
Mississippi Department of
Education
Post Office Box 771
Jackson, MS 39205
(601)359-2795
FAX (601)359-2326

SOUTH CAROLINA

Catherine Thomas
State Facilitator
South Carolina Department of
Education
1429 Senate Street
Columbia, SC 29201
(803)734-8446
FAX (803)734-8624

Contact your state facilitator for additional information about the network or the NDN projects featured in this document. You can also contact schools with NDN projects directly.

National Diffusion Network: Mathematics Programs

Project CLIMB

Project CLIMB: Coordinated Learning Integration--Middlesex Basics emphasizes basic skills in reading, writing, and mathematics. Incorporating National Council for Teachers of Mathematics standards, the program features an enjoyable hands-on approach to mathematics instruction.

Its coordinated instructional program includes a diagnostic package identifying K-12 reading and mathematics skills; a writing package that integrates reading, writing, and thinking skills across the curriculum; survey and criterion-referenced tests to evaluate student performance; and a simplified record-keeping system for continuously monitoring progress. The management design provides a unified approach to achieving instructional goals by coordinating personnel, materials, and services; communication between classrooms and support services; and instruction across grade levels.

Grades K-12

Contact:
Barbara Brenner
Director, Project CLIMB
Middlesex Public Schools
Administration Offices
Kennedy Drive
Middlesex, NJ 08846
(908)968-4494

Comprehensive School Mathematics Program

An underlying assumption of the Comprehensive School Mathematics Program (CSMP) curriculum is that children can learn and enjoy mathematics much more than they do now. To increase both the learning and enjoyment of mathematics, program content is presented not as an artificial structure, but as an extension of experiences children encounter in their development, both at the "real-life" and fantasy levels.

Using a "pedagogy of situations," the teacher leads children through sequences of problem-solving experiences presented as games or stories. The content is completely sequenced in spiral form so that students are brought into contact with each area of content throughout the program. As the situations become more challenging, the children build on interlocking experiences of increasing sophistication.

A unique feature of CSMP is the use of nonverbal languages that give children immediate access to mathematical ideas and methods necessary for solving problems and for continually expanding their understanding of mathematical concepts.

Grades K-6

Contact:
Clare Heidema
Director, CSMP
McREL
2550 S. Parker Road
Suite 500
Aurora, CO 80014
(303)337-0990

Computers Helping Instruction and Learning Development

Computers Helping Instruction and Learning Development (CHILD) creates classroom conditions conducive to learning with technology and integrates technology into reading, math, and language arts. It also offers strategies for teaming, cooperative learning, and parent involvement. Teachers work with same students for three years.

Three classrooms form a Project CHILD cluster, grades K-2 or 3-5. Each cluster teacher becomes a content specialist for one of the three Project CHILD subject areas in addition to being responsible for one grade-level classroom. Students from each grade in the cluster spend one hour per day working in each of the three subject areas. A Project CHILD classroom is organized with learning stations, and each classroom has a computer station with three to six computers, a teacher station for small-group instruction, textbook and writing stations, and hands-on activity stations. Required curriculum content is covered in six-week thematic units.

Grades K-5

Contact:
Doug Applegate
Daniel Memorial Institute, Inc.
6700 Southpoint Parkway
Suite 100
Jacksonville, Florida 32216
(904)448-7612
(800)226-7612

National Diffusion Network: Mathematics Programs

Computer-Assisted Diagnostic Prescriptive Program in Reading and Mathematics

The Computer-Assisted Diagnostic Prescriptive Program (CADPP) is a database management system designed to assist teachers with diagnosis and prescription. With this system, teachers load files containing individual student characteristics, such as age, instructional level, and learning modality and compare them with the characteristics of instructional materials, such as readability level, interest level, and learning modality. The CADPP program then generates customized learner prescriptions and individualized educational plans.

This relational database is menu-driven and requires no programming skills. Because it can be copied for multiple users in all curriculum content areas, it can be used in one classroom, by a school, or throughout a district.

Originally designed for economically disadvantaged students, the CADPP program has been successfully used with Chapter I, migrant programs, competency-based education, and other programs in 47 states.

Grades 3-9

Contact:
Debra J. Roberson
Technology in Education
3936 West 78th Court, #21
Merrillville, IN 46410
(219)769-1712

Decision-Making Mathematics

Decision-Making Mathematics (DMM) teaches students a step-by-step plan for solving mathematics problems successfully. Methods used include questioning, planning, organizing data, and analyzing and applying solutions. Through this program, students solve problems both in and out of the classroom.

Students learn to use a four-step problem-solving strategy of understanding, planning, answering, and checking; draw inferences from graphs, tables, and charts; and apply mathematics to the world beyond the classroom. DMM emphasizes processes rather than solutions through a variety of methods including questioning and planning, interpreting and verifying, organizing and manipulating data, and analyzing and applying solutions. Cooperative learning and alternative assessment techniques are also stressed throughout the program.

Not only does DMM help students become effective decision makers, but it also provides teachers a vehicle for establishing a problem-solving climate in the classroom.

Grades 7-9

Contact:
Laura D. Dunn
Education and Technology Foundation
4655 25th Street
San Francisco, CA 94114
(415)824-5911

Effective Videodisc Instruction in Core Mathematics Concepts

The Effective Videodisc Instruction in Core Mathematics Concepts program improves math achievement of diverse groups of learners, including regular, remedial, mainstreamed, and mildly handicapped students. Videodiscs and print materials provide students guided practice in mathematics concepts and systematic reviews of skills.

Using a hand-held remote controller, the teacher conducts the videodisc lesson while monitoring and reinforcing student progress. Videodisc demonstrations are fast-paced, with each demonstration including intensive questioning.

If students experience difficulty, the teacher can provide additional guided practice through the videodisc. To emphasize concept development rather than rote learning, two or three sets of parallel examples are available for reteaching.

Grades 5-7

Contact:
Alan Hofmeister
Technology Division
Center for Persons with Disabilities
Utah State University
Logan, UT 84322-6800
(801)750-3718

National Diffusion Network: Mathematics Programs

Mathematics Achievement through Problem Solving

The Mathematics Achievement through Problem Solving (MAPS) program is designed to replace the existing first-year secondary general mathematics program. The MAPS curriculum is grounded in the constructivist perspective that students build conceptual frameworks while they are engaged in activities requiring problem solving and decision making. The teacher functions as a facilitator rather than a lecturer.

Extensive use of investigations and small-group problem solving enable students to construct generalizations of mathematical concepts and relationships. Students also learn to use calculators and computers as problem-solving tools.

Learning materials consist of ten strands, including estimation and mental arithmetic, heuristic problem solving, number concepts, spatial visualization, probability, statistics, measurement, applied problem solving, intuitive algebra, and computer problem solving.

Grades 9-10

Contact:
Jean Boddy
Mathematics Education Specialist
Department of Curriculum and Instruction
Purdue University
West Lafayette, IN 47907-1442
(317)494-0803

Relationships and Math-Friendly Science

Relationships and Mathematics in Physical Science (RAMPS) provides innovative curriculum materials for a one-year, eighth/ninth grade physical science course. Topics include organization of knowledge, mathematical procedures used in science, relationships, proportionality, equations, and ways equations show relationships.

RAMPS material is introduced gradually and applied to science topics to demonstrate that knowledge of mathematics is useful to understanding science. The book provides questions at the end of each chapter that focus attention on key ideas; many subsections are optional, allowing the teacher to cover those topics most suitable for the student's interest and abilities. The text also includes a number of hands-on activities.

RAMPS strengthens science education through mathematical understanding and by increasing the substantive background of teachers.

Grades 8-9

Contact:
Madeline P. Goodstein
PRIMAK Educational Foundation
Post Office Box 701
Devon, PA 19333
(215)687-6252

Successful Inservice Through Turnkey Education

The Successful Inservice through Turnkey Education (SITE) program integrates mathematics content and methodology using hands-on activities with a variety of manipulatives.

SITE uses processes and activities that are immediately applicable in the classroom. Activities are integrated with existing math curricula and mesh with every textbook. SITE addresses all of the K-4 and 12 of the 13 National Council of Teachers of Mathematics standards for grades 5-8. Mathematics content is presented through cooperative grouping, questioning strategies, and guided discovery. The program provides printed instructional materials as well as necessary equipment.

SITE may be adopted at two levels: (1) direct training for classroom teachers (15-25 hours over 3-4 days on mathematics content and teaching strategies); or (2) training of trainers. After one year of classroom implementation, selected participants receive 6-12 hours of additional instruction, focusing on training skills. They act as turnkey trainers for other teachers in their schools or districts while continuing to implement the SITE program.

Grades K-8

Contact:
Barbara Berman, Ph.D.
Fredda Friederwitzer, Ph.D.
Co-Directors, SITE
Educational Support Systems, Inc.
446 Travis Avenue
Staten Island, NY 10314
(718)698-3636

National Diffusion Network: Mathematics Programs

First-Level Mathematics (Kindermath)

First-Level Mathematics (Kindermath) provides initial mathematics instruction by having students physically manipulate concrete objects.

A comprehensive program in math fundamentals, Kindermath provides diagnosis, prescription, and a sequential curriculum designed to foster individual developmental growth. The ninety lessons are presented in nine components: same and different, patterns, sets zero to five, shapes, sets six to ten, numerals six to ten, signs, addition, and subtraction. Key elements of the program are developmental hierarchies, mixed instructional modes, and an extended curriculum range.

The entire program (including voice synthesizer) is available for use on computers requiring minimal teacher assistance. The program is also available in Spanish.

Grades K-1

Contact:
Mary Alice Felleison
38 North Waterloo Road
Devon, PA 19333
(215)687-6252

Success Understanding Math

Based upon Jean Piaget's research on how children learn mathematics, Success Understanding Math (SUM) is designed to assist elementary school children develop abstract reasoning skills.

Through the SUM approach, teachers guide students as they manipulate concrete objects to solve problems, providing direct instruction to facilitate interactions and an understanding of mathematics concepts.

Originally designed to increase the level of mathematics achievement of children who are functioning below grade level, the materials and teaching techniques of SUM are appropriate for students of all ability levels. The program may also be used in conjunction with any commercial textbook.

Grades 1-6

Contact:
Kathleen Bullington
Project Director
Success Understanding Mathematics
Des Moines Public Schools
1800 Grand Avenue, Room 317B
Des Moines, IA 50309
(515)242-7860

National Diffusion Network: Science Programs

Fishbanks, Ltd.

Fishbanks, Ltd., is a computer-based, role-playing simulation that teaches the principles of sustainable resource management. Its purpose is to promote an understanding of the complex, dynamic systems governing productivity in the natural environment, thereby enabling students to formulate economically and politically feasible policies that will sustain the productivity of natural resources.

The program teaches students facts about the fishing industry and prepares them to act as informed, effective problem solvers. Students then debate policies related to environmental resources, applying analytic reasoning, negotiation, and collective decision-making skills.

The two-hour simulation is based on a multidisciplinary model linking environmental science and biology to economics, social studies, and mathematics while enhancing general reasoning and communication skills.

Grades 7-12

Contact:
Barbara van der Waals
Laboratory for Interactive Learning
Institute for Policy and Social Research
Hood House
University of New Hampshire
Durham, NH 03824
(603)862-2186

For Sea: Investigating Marine Science

Capitalizing on the inherent appeal of the sea, For Sea: Investigating Marine Science uses the study of coastal waters as an incentive to learn science. The program develops basic science skills and knowledge through an interdisciplinary, activity-oriented marine education curriculum. The purpose of the program is to equip students with the experiences and information necessary to make responsible decisions about the marine environment.

For Sea can be used as a core curriculum or as a thematic unit. Close proximity to sea water is not necessary to implement this program in the classroom.

Grades 1-6

Contact:
Laurie A. Dumdie
Marine Science Center
18743 Front St., NE
Poulsbo, WA 98370
(206)779-5549

Geology Is

Geology Is is an introductory geoscience course designed to make students more responsible consumers of the Earth's resources and protectors of the environment.

Designed as a one- or two-semester course, Geology Is features units in Earth Materials, Observing the Earth, Internal Processes, and External Processes. Each unit contains text material, laboratory exercises, and objective and subjective tests.

The course promotes understanding of energy, geologic hazards, land use, and geoscience processes through a broad range of materials and media, including slide-tapes, films, videotapes, and guest speaker presentations. Instruction is followed by individual and small-group investigations of topical areas and by on- and off-campus field study.

Grads 9-12

Contact:
Ron D. Turley
O'Fallon Township High School
600 South Smiley
O'Fallon, IL 62269
(618)632-3507

National Diffusion Network: Science Programs

Hands-On Elementary Science

The Hands-On Elementary Science program teaches problem solving by developing science process skills. The classroom and school grounds become a science laboratory where students undertake hands-on activities blending physical, earth, and life science.

Higher order thinking skills are taught at each grade level through four units of instruction. First graders develop observation skills by studying seeds, patterns, magnets, and liquids. Second graders work on classification skills through the study of insects, water, measurement, and life cycles. In third grade, experimentation skills are emphasized in units of flight, measurement, plants, and structures. Fourth-grade study focuses on analysis with units on biocommunities, electricity, chemistry, and energy transfer. The fifth-grade curriculum emphasizes application with units on earth science, soil analysis, animals, and ecosystems. The program has an optional package of materials students may request to work on over the summer.

The program also fosters positive teacher attitudes toward science, thereby increasing the amount of science taught.

Grades 1-5

Contact:
Helen Herlocker
Project Director
Hands-On Elementary Science
Dissemination Center
Post Office Box 661
Hampstead, MD 21074
(410)374-1358

Informal Science Study

Informal Science Study (IfSS) is a wholly student-centered approach to the study of physical and biological science. This curriculum appeals to students by offering high-interest mini-units and laboratory exercises, by illustrating scientific principles with concrete examples, and by introducing scientific concepts with non-technical language.

Among IfSS's mini-units is Physics of Fun and Play, which introduces the study of physics through popular amusement park rides. The Informal Science Safari and Toy Workshop unit includes pre-algebra exercises in laboratory activities conducted with such toys as race cars and model rockets.

Other modules introduce scientific concepts through analyses of sports and playground activities. The processes of inferring, graphing, predicting, and forming hypotheses are taught through such topics as motion, acceleration, relativity, forces, gravity, time, graphing, and conservation of energy.

Grade Levels: 5-12

Contact:
Howard Jones
Project Director
500 Coffman, Suite 112
Longmont, CO 80501
(303)651-0833

Investigating and Evaluating Environmental Issues and Actions

Through the Investigating and Evaluating Environmental Issues and Actions program, students develop information-processing, problem solving, and decision-making skills while examining environmental problems and issues.

The Issues and Actions program's six modules introduce students to local environmental issues as well as the skills they need to investigate, analyze, evaluate, and respond to the issues. Typically completed within one semester, the curriculum can be infused into existing science, social studies, or language arts classes or adapted for interdisciplinary instruction.

In addition to developing critical thinking skills, the program promotes citizenship in students.

Grades 5-16

Contact:
Trudi L. Volk
Department of Curriculum and
Instruction
Southern Illinois University
Carbondale, IL 62901
(618)536-2441

National Diffusion Network: Science Programs

Jeffco Middle School Life Science Program

The Jeffco Middle School Life Science Program develops critical thinking skills through the study of the human body, basic ecological principles, and environmental problems and issues.

Instruction is delivered in a learning cycle of three phases: exploration, concept formation, and application. In the exploration stage, students conduct an experiment or investigation. During this stage, students are introduced to phenomena and experiences that lead to concept development. In the final phase, students apply their concepts in an application activity or discussion. The development of thinking skills is emphasized throughout the program through cooperative learning, inquiry, and interdisciplinary activities.

The Life Science program is a full-year course that can replace existing general science or life science courses or be integrated within a science-health course.

Grades 7-8

Contact:
Harold Pratt
Jefferson County Public Schools
1829 Denver West Drive
Building 27
Golden, CO 80401
(303)273-6500

Keyboarding, Reading, and Spelling

Keyboarding, Reading, and Spelling (KRS) teaches students to use a microcomputer keyboard while learning to type, read, and spell. The program uses a phonetic approach to reading, with the microcomputer serving as an essential component of the instructional process. Following instruction by the teacher, students work independently at the computer as they master skills through reinforced practice.

The KRS program works well in classrooms equipped with one or more computers or in a computer lab.

Grades 1-8

Contact:
Ethna R. Reid
Reid Foundation
3310 South, 2700 East
Salt Lake City, UT 84109
(801)486-5083

Life Lab Science

The Life Lab Science program is applied science instruction that transforms elementary school grounds and classrooms into "living laboratories." In this program, students study science, nutrition, and gardening, applying their knowledge to indoor and outdoor garden activities.

Students conduct experiments, applying scientific methods as they observe, collect, and analyze data. In addition to growing vegetables, herbs, and flowers, students maintain gardens and establish worm colonies.

The Life Lab Science program strives to sustain students' interest in science by enhancing their scientific knowledge and skills, ensuring that students have successful experiences, and fostering positive attudes toward science.

Grades 2-6

Contact:
Gary Appel
Life Lab Science Program
1156 High Street
Santa Cruz, CA 95064
(408)459-2001

National Diffusion Network: Science Programs

Mechanical Universe *High School Adaptation*

The Mechanical Universe: *High School Adaptation* program is an innovative approach to motivating students to master a conceptual understanding of physics.

The program's videotapes can take the student from a view of Newton working at his desk to close-ups of complicated experiments and modern nuclear laboratories, or from animated cartoons of gravitational effects to three-dimensional computer graphics that come "alive," clarifying abstract concepts.

Grades 9-12

Contact:
Richard P. Olenick
Department of Physics
University of Dallas
1845 East Northgate Drive
Irving, TX 75062
(214)721-5072

Pablo Python Looks at Animals

Pablo Python Looks at Animals is a basic introduction to life science that combines classroom instruction and the scientific resources of zoos. Stressing the development of observation skills, this multidisciplinary approach incorporates communication skills, mathematics, reading, and the arts to teach fundamental science skills.

Program materials consist of a series of six books (and an audiotape of animal sounds), each devoted to a different science topic. Lessons typically begin with a motivational activity such as a song, game, poem, or story. A variety of learning activities involve the students in small group instruction and cooperative learning situations.

With its flexible modular format, the program can be used as the entire science curriculum or as a supplement.

Gradels K-3

Contact:
Annette Berkovits
Director of Education
Bronx Zoo
185th Street and Southern Blvd.
New York, NY 10460
(212)220-5135

Physics Resources and Instructional Strategies for Motivating Students

Physics Resources and Instructional Strategies for Motivating Students (PRISMS) blends exploratory activities, concept development, and application activities into a learning cycle.

Physics concepts are taught through high-interest activities involving cars, bicycles, balloon rockets, dart guns, and sailboats. Explorations encourage students to observe relationships, identify variables, and develop explanations of phenomena. Students test their generalizations through observations.

The *PRISMS Teacher Resource Guide* covers kinematics, dynamics, work and energy, internal energy and heat, wave phenomena, electricity and magnetism, and atomic and nuclear physics. For each of 125 activities there are student sheets and teacher notes with teaching strategies, sample observations and calculations, a summary of the concepts or outcome of the activity, and time requirements. Student evaluation aids include a check list of indicators of student involvement in the laboratory activities and a computer test bank of over 2,000 questions keyed to course objectives and ranked by levels of reasoning.

Grades 10-12

Contact:
Roy Unruh
PRISMS
Physics Department
University of Northern Iowa
Cedar Falls, IA 50614
(319)273-2918

National Diffusion Network: Science Programs

Physics-Teach to Learn

The Physics-Teach to Learn program is an instructional program that enables a teacher to use a computer to simulate physical events that are difficult or impossible to replicate in the classroom. The purpose of the program is to teach students to understand and apply the concepts underlying physical phenomena.

Each of the Physics-Teach to Learn's 23 instructional modules features a teacher-controlled computer simulation and extensive written material designed to help the teacher present key concepts. Using a step-by-step approach, a teacher is able to correct students' misconceptions about phenomena and guide them to accurate judgements about physical events.

A computer can print any screen display, including text and graphics, from the Physics-Teach to Learn program and generate additional materials for student activities.

Grades 12

Contact:
Pamela Williams, Director
Charles Schleiden, Disseminator
Bell High School
Bell, CA 90201-3201
(213)773-2408

Sci-Math

Sci-Math is a modular curriculum that uses the mathematics of rates and ratios to simplify problem solving in science, mathematics, and everyday life. The program is divided into two modules. Module One deals with the arithmetic and logic of proportions. Module Two examines how algebraic equations express proportions and studies the graphical interpretation of proportions.

More than 20 hands-on activities and experiments address situations at home, school and business that are already familiar to students. Through techniques such as cooperative learning, students are able to build a tool chest of problem-solving strategies that they can apply beyond their math classes to the sciences and social studies as well as to consumer and business decisions.

Sci-Math can be implemented as a mini-course, a supplement, or as a parallel course. Advanced algebra, chemistry, or physics students can assimilate the core Sci-Math concepts in as little as two weeks; less advanced or younger students may need three to six weeks depending upon the desired skill level.

Grades 7-12

Contact:
James McAuliffe
Sci-Math Director
Education and Technology Foundation
4655 25th Street
San Francisco, CA 94114
(415)824-5911

Wildlife Inquiry Through Zoo Education Survival Strategies

The Wildlife Inquiry Through Zoo Education (WIZE) program is a non-traditional, multi-disciplinary approach to teaching concepts related to population, ecology, wildlife conservation, and species survival. The program's goal is to encourage young people to approach difficult problems analytically and make decisions informed by a firm understanding of complex scientific concepts.

In Module II, Survival Strategies, students learn that animals are members of populations that interact with one another and that ecological processes affecting animals also affect humans. The program challenges students to address wildlife survival issues of global scale and enables them to provide intelligent answers to its central question: will wildlife as we know it survive through the 21st century?

The program can serve as an independent curriculum or as a supplement to an existing life science or environmental education program.

Grades 7-9

Contact:
Annette Berkovits
Director of Education
Bronx Zoo
185th Street and Southern Blvd.
Bronx, NY 10460
(212)220-5135

SERVE
PRODUCTS AND SERVICES
ORDER FORM

Hot Topics

Developed with input from educators throughout the Southeast, these research-based guidebooks offer information, resources, descriptions of exemplary programs, and contacts for additional information. See p. 64 for prices.

Quantity

___ *Reducing School Violence*
- ❑ Regional Edition (110 pages)
- ❑ Florida Edition (112 pages)

___ *Appreciating Differences: Teaching and Learning in a Culturally Diverse Classroom* (116 pages)

___ *Interagency Collaboration: Improving the Delivery of Services to Children and Families* (118 pages)

___ *Using Technology to Improve Teaching and Learning* (90 pages)

___ *Schools for the 21st Century: New Roles for Teachers and Principals* (94 pages)

___ *Comprehensive School Improvement* (95 pages)

___ *Problem-Centered Learning in Mathematics and Science* (60 pages)

SERVE Reports

___ *Southern Crossroads: A Demographic Look at the Southeast*, by Harold Hodgkinson (90 pages, $7–see p. 64 for large-order discounts.)

___ *A Public-Private Partnership: South Pointe Elementary School* (31 pages, $5)

___ *Supporting Family Involvement in Early Childhood Education: A Guide for Business* (50 pages, $5)

EDTALK

Co-produced with the Council for Educational Development and Research, this series focuses on educational improvement. See p. 64 for prices.

Quantity

___ *EDTALK: What We Know About Mathematics Teaching and Learning* (69 pages)

___ *EDTALK: Rural Schools on the Road to Reform* (70 pages)

___ *EDTALK: What We Know About Science Teaching and Learning* (70 pages)

Sharing Success

The SERVE *Sharing Success* series describes outstanding school and district programs in the Southeast that focus on the national goals for education. Single copies of the following are available at no cost:

- ❑ *Sharing Success: Mathematics and Science Education* (72 pages)
- ❑ *Sharing Success: Promising Programs in Preschool-to-School Transition* (62 pages)

Telecommunications

SERVE produces a variety of VHS tapes that give stakeholders in education the opportunity to see school improvement and reform initiatives in action.

Quantity

Southern Crossroads–Noted demographer Harold Hodgkinson examines demographic trends in the Southeast and discusses the challenges and opportunities they present (30 min., $29.95). *Special: Order *Southern Crossroads* publication and videotape for only $35. _____

A Generation of Hope–An examination of seven key characteristics of effective school programs to reduce and prevent student drug use (30 min., $29.95). _____

Journey Toward Change–offers ideas, strategies, and inspiration to school improvement teams from educators who have participated in successful school improvement initiatives. A complementary film to *Hot Topics: Comprehensive School Improvement* (25 min., $14.95). *Special: Order report and tape for $20. _____

Improving Mathematics and Science Education

- **General Audiences**–A close look at exemplary mathematics, science, and technology programs in several schools in the Southeast (30 min., $29.95) _____
- **Policymakers**–A panel discussion with the region's chief state school officers, business leaders, and others on promoting change; features exemplary school programs in mathematics, science, and technology (60 min., $29.95) _____
- **Teachers/Practitioners**–A panel discussion with award-winning teachers on how to implement innovative programs and practices; features exemplary school programs in mathematics, science, and technology (90 min., $29.95) _____

ORDERING INFORMATION

Prices for *Hot Topics, EDTALK, and Southern Crossroads* are as follows:

$7 each for 1-49 copies $6 each for 50-99 copies $5 each for 100 copies or more

Name:_____ **Title:**_____
(Please print)

Address: (❑ home ❑ work)

_____

_____

City:_____ **State:**_____ **Zip**_____

Phone:(_____ **)**_____ **Fax:(** _____ **)**_____

TO ORDER: Make check or purchase order to NEFEC/SERVE (Federal ID# 59-6000-821). Remove or copy this order form and send it with your check or purchase order to **NEFEC/SERVE,** Route 1, Box 8500, 3841 Reid Street, Palatka, FL 32177. Payment must accompany order.

SERVE
SouthEastern Regional Vision for Education

Free
SERVE PRODUCTS AND SERVICES
ORDER FORM

The SouthEastern Regional Vision for Education (SERVE) offers a number of products and services designed to promote educational improvement. Single copies of the following items are available at no cost. Please check the box for the item(s) you wish to receive and mail to SERVE, 345 South Magnolia Drive, Suite D-23, Tallahassee, FL 32301-2950.

Name: _____ **Title:** _____
(Please print)

Address: ❑ home ❑ work (check one)

_____

City: _____ **State:** _____ **Zip:** _____

Phone: (_____) _____ **Fax:** (_____) _____

PUBLICATIONS

- ❑ *SERVE Brochure*—overview of laboratory activities
- ❑ *Sharing Success: Mathematics, Science, and Computer Education*—descriptions of 54 outstanding school and district programs in the southeast (72 pages)
- ❑ *Sharing Success: Promising Programs in Preschool-to-School Transition*—detailed descriptions of 19 schools and/or districts in the Southeast with outstanding early childhood transition programs (62 pages)
- ❑ *What Teachers Have to Say About Creating Innovations in Education: Proceedings from the Sharing Success Forum* (24 pages)
- ❑ *Minority Teacher Recruitment*—a policy brief (4 pages)
- ❑ *The Need for Improved Mathematics and Science Education*—a policy brief (8 pages)
- ❑ *What's Happening in Educational Assessment?*—a report for policymakers on the latest trends in assessment (13 pages)
- ❑ *A Resource Booklet on Transitions* (35 pages)
- ❑ *Reducing Baby Bottle Tooth Decay in Native American Communities (6 pages)*
- ❑ *Retention in Early Childhood Education* (4 pages)
- ❑ *Assessment in Early Childhood Education* (4 pages)
- ❑ *Early Childhood Regional Symposium Proceedings, 1991* (20 pages)
- ❑ *Spotlight on Success: Early Childhood Regional Symposium Proceedings, 1992* (35 pages)

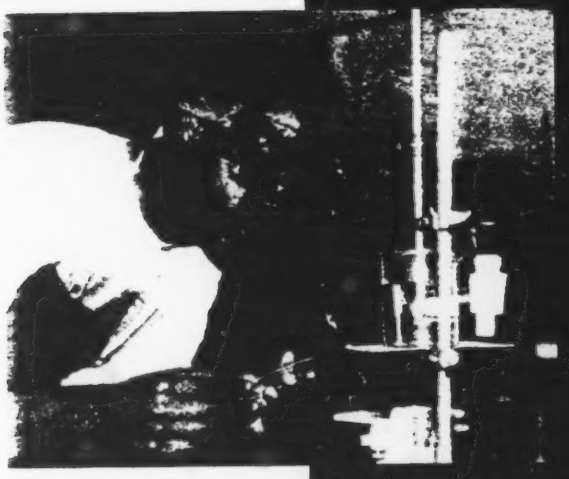
COMPUTER/ELECTRONIC INFORMATION SERVICES

Database Information Services Clearinghouse (DISC)
DISC is SERVE's computerized research service for identifying periodicals and other publications on topics related to education. Offered free to educators in the Southeast, DISC provides access to the Educational Resources Information Center (ERIC) and over 300 other computer databases of information on education. Educators who request literature searches from DISC will recieve research packets that include abstracts of relevant articles and other publications, a copy of one or more relevant journal articles, and a copy of an ERIC document.

For further information about this service, call (800)352-3747 or write to SERVE at the address at the top of this page.

SERVE-Line
SERVE-Line is a nationwide computerized communication system that educators can use to access and exchange information. With SERVE-Line (and a computer and a modem), educators can send messages to each other through an electronic mail system; share opinions, ask questions, and make announcements pertaining to education; copy public domain educational software; and learn about educational events, the latest educational research, and other information of interest. The majority of SERVE-Line's menu items are available for use at no cost.

To connect with SERVE-Line via a computer and modem, dial (800)487-7605. For more information, call (404)577-7737 or (800)377-5011 or write to SERVE, 41 Marietta Street, NW, Suite 1000, Atlanta, GA 30303.



SERVE OFFICES

P.O. Box 5367
Greensboro, NC 27435
800-755-3277
919-334-3211

345 South Magnolia Drive
Suite D-23
Tallahassee, FL 32301-2950
800-352-6001
904-922-2300

41 Marietta Street NW
Suite 1000
Atlanta, GA 30303
800-659-3204
404-577-7737

Delta State University
P.O. Box 3183
Cleveland, MS 38733
800-326-4548
601-846-4384

BEST COPY AVAILABLE